OCT. 9 1959

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

Would fewer stations boost profits? 15
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Optimum weight, speed aid drilling 25
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Two U.S. firms may drill in Italy 88
Training reduces dealer turnover 102

SPECIAL REPORT

Price 50 Cents

In drilling:
Cost cutting
requires a
new concept 40

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EDITORIAL DEPT
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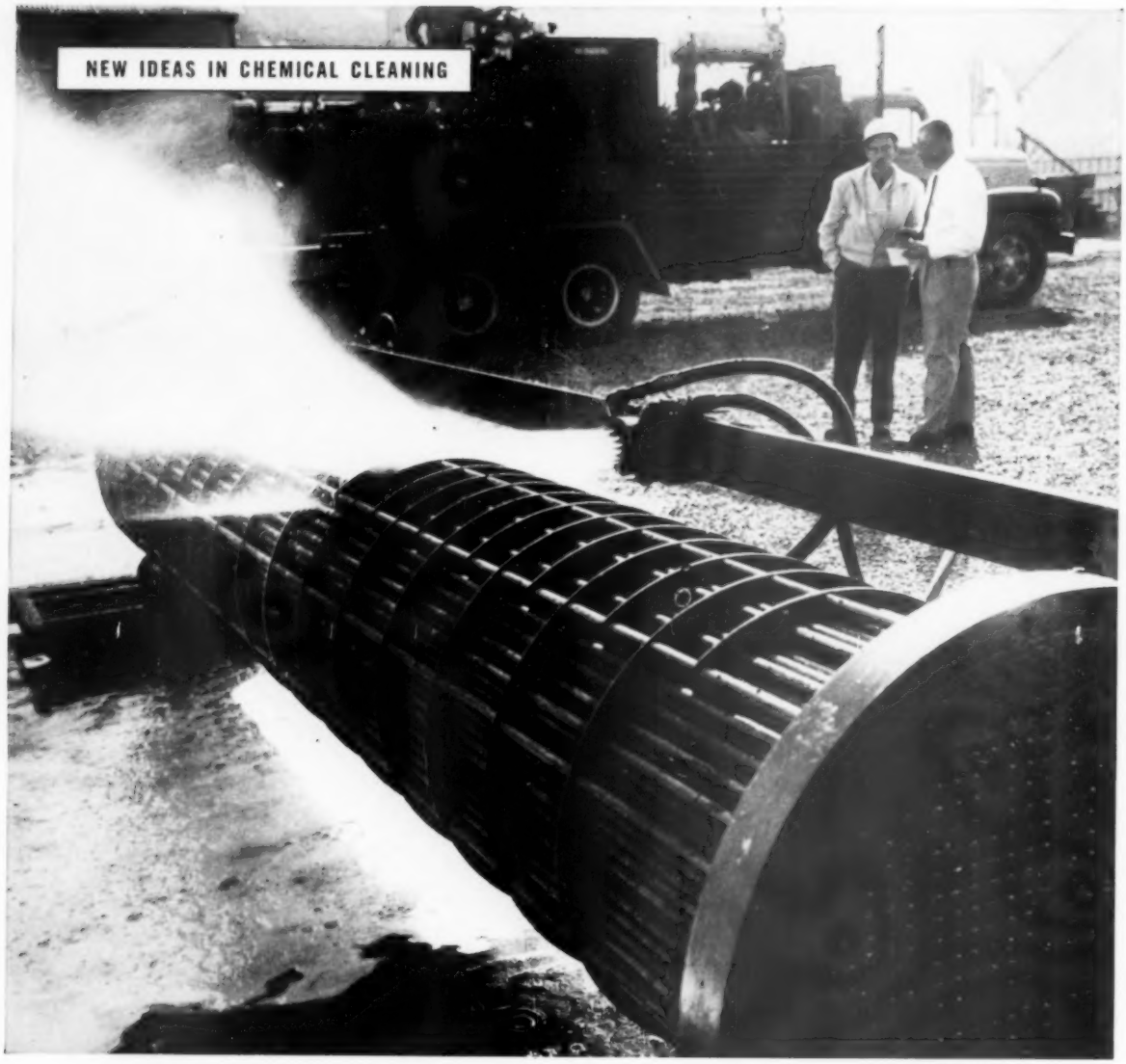

New Jetting Tool To Clean Tube Bundles Saves Thousands Of Dollars

The new high-pressure hydraulic tool, shown above, is currently saving thousands of dollars for companies in the refining, chemical, and petrochemical industries. It is the jetting tool developed by Dowell to remove deposits from heat exchanger tube bundles.

Previous methods of cleaning these bundles have been costly, time-consuming and often inadequate. Many times bundles had to be replaced completely because of the lack of a suitable cleaning method.

This new Dowell tool has a remarkable record of thorough, fast cleaning. For example, a slurry reboiler exchanger bundle, three feet in diameter and 16 feet long, was fouled with deposits of coke and asphalt. After being jetted from only one side, the bundle was thoroughly clean. Time required: less than one hour.

The tool holds the bundle in place for cleaning and has flanged rollers for rotation. The jet-head is manipulated automatically so that all tube spaces are covered. The jetted liquid can be either water or chemical solvents.

This high-velocity jetting device is another example of the new ideas Dowell continues to offer in chemical cleaning to help you cut your costs. Whatever the cleaning problem in your plant, call Dowell for an engineered recommendation. Dowell — the largest, the oldest, the most experienced chemical cleaning service — Tulsa 1, Oklahoma; and 165 stations and offices in major industrial centers.

Chemical cleaning service for all industry

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DIVISION OF THE DOW CHEMICAL COMPANY

THIS makes the difference!

Wear and corrosion of silver wrist pin bushings and copper-lead bearings was once a serious problem in railroad diesel engines. No more.

"Ethyl" Antioxidant 702 definitely minimizes deterioration of these vital parts. Here's proof:

Shown above at the left are silver and copper strips tested for 72 hours at 275°F. with a commercial oil containing no "Ethyl" Antioxidant 702. Note the corrosion. On the right identical pieces comparably tested but using 702 as *the* antioxidant—show no evidence of metal attack.

The reason? 702 is completely inert... contains no potential corrosive of any kind. This, of course, is in addition to the striking ring wear inhibition provided by this new member of Ethyl's antioxidant family.

Now you can offer your customers the corrosion-proof and antiwear oils they need to cut maintenance and replacement costs. Now engines—like diesels with silver wrist pin bushings and other parts of copper, copper-lead, or bronze—will run more economically ...for longer periods.

Like to know more about this versatile, high-temperature antioxidant—now commercially available? Ask your Ethyl Representative. He'll be glad to see that you get the facts.

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THREDKOTE 701

keeps your tool joints on the job

For longer tool joint service, protect the threads from first trip to last with Humble's Thredkote 701.

Give new tool joints a specially careful and generous coat for good lubrication and maximum protection. Continued use of Thredkote 701 on each trip will keep your string running tight and true.

Joints make up tight and break out easy. As the string is run, the 60% pure metallic zinc in Thredkote 701 effectively guards against metal-to-metal contact and prevents galling. And Thredkote 701 maintains its quality and consistency under the most rugged running conditions.

Thredkote 701 is available in 25 lb. pails and in 200 lb. and 600 lb. drums. Call your nearest Humble wholesale plant in Texas and New Mexico. Thredkote is also available through many oil field supply stores. The price is right, and delivery is quick.

Other Humble Thread Compounds

- **THREDKOTE 700** — lower cost, red lead base lubricant for casing, tubing and tool joints.
- **THREDKOTE 703** — 85% metallic zinc, for use where pressures exceed 2000 lbs. per square inch.
- **THREDKOTE 705** — lubricates, fills and seals worn, wobbly tool joints.
- **THREDKOTE 706** — meets all requirements for A.P.I. high pressure thread lubricants suitable for pressures exceeding 10,000 lbs. psi.
- **THREDKOTE 708** — forms an insoluble seal at threaded connections servicing gas, gasoline, solvents and kerosene.
- **THREDLOK 801** — a new product for sealing and locking casing joints.

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INSIDE *Slant*

EGGS BIG, NOT GOLDEN

Government, both state and federal, is very much a part of the petroleum industry in Louisiana.

This is aside from being a tax collector and "umpire," Bouwe Dykstra, area vice-president for Shell Oil Co., points out.

Dykstra, just reelected president of the Louisiana-Arkansas division, Mid-Continent Oil & Gas Assn., said:

During May, 50% of the state's oil production came from state and federal leases, as well as 29% of its gas production.

From onshore and offshore state lands, the output was 9.7-million bbl. of oil and 31-billion cu.ft.of gas.

From federal lands, the production in May totaled 3.3-million bbl. of oil and 18.9-billion cu. ft. of gas.

Total Louisiana production for May was 26-million bbl. of oil and 175-billion cu. ft. of gas.

All the more reason, as Dykstra noted, that "better understanding of our industry by the people and legislators is imperative.

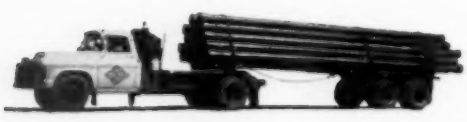
"Our industry proved that it can turn wastelands and useless waterbottoms into gold, but it should dispel the impression that it is a 'chicken laying golden eggs.' "

LeRoy Menzing
EDITOR

Congrats and $25 to J. A. LONG, Rua Uruguaiana 118 - 9° andar Rio de Janeiro, Brazil

Joe Roughneck, heart of the oil and gas industry, likes the convenience and economy of having Lone Star's ultra-modern pipe mill right in the middle of his workshop. Lone Star maintains the largest mill stock of API casing and tubing in the entire oil country. Delivery can be made overnight to 75 per cent of the active areas. Lone Star's recently enlarged plant is, more than ever, Joe Roughneck's solid source of supply.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.



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Views That

"If a common purchaser in Texas can elect tomorrow that it will not purchase any oil from any new field in Texas, without regard to the statutory prohibition against discrimination 'as between fields in this state,' then the days of the Texas wildcatter are numbered, as indeed is the future health and stability of the crude producing industry in Texas."

—JOHN DAVENPORT
Attorney for several independent producers' associations in Texas

"The Arctic islands may be an area which will give us reserves on this continent of an amount to make us independent of oil from the Middle East, the Sahara, and South America."

—J. E. BALTRUSAITIS
Manager, exploration
Dome Petroleum Co.

"Our society has grown and become increasingly complex, and it consists of many kinds of groups. Some are geographic, some are ethnic, some are economic, some are social —and some are something else. In a sense, it's true that today ours is a nation of pressure groups. I'm sure the average Congressman would say 'amen' to this.

"The farmers, the veterans, the oil men of the Southwest are fair examples of the many such groups which are engaged in this national struggle, each a firm believer in the old adage that the wheel that squeaks the loudest gets the grease."

—HAROLD S. SKINNER
Director of Public Affairs, assistant to the President
Continental Oil Co.

"I would like to propose . . . that there are two major things we will need to do in the near future if we are to . . . really get ourselves across to the public as an industry.

"First of all, we will need to throw ourselves wholeheartedly into the concept of personal public relations. It takes more than just a handful of people to do this—it takes everyone who can be put to work. . .

"The second is our need to get together as an industry and face the problems that confront us as a solid group—not as a bunch of little boys who can't see beyond their own backyards. Remember, the public sees us not as producers, refiners, or distributors—but as the oil industry.

"Unless we can get together, there are strong indications that we will be split up and hacked to pieces on some of the major issues that confront us."

—M. S. HAUSER
Manager, public relations
Ohio Oil Co.

Make News . . .

"During the period from 1950 to 1953, an 8,500-ft. well in Texas was allowed to produce an average of 99 bbl. of oil per calender day. Today this same well is allowed to produce about 45 bbl. Assuming a well cost of $115,000, this means that the operator used to receive .86 b/d for each $1,000 invested—compared to .37 bbl. today. In Louisiana, the operator has fared slightly better—during that same period (1950-53) a similar depth well was allowed a daily production of 235 b/d. Today its allowable is 81 b/d. Using the same comparison, the producer's production has been reduced from 2.04 b/d to .70 b/d for each $1,000 invested. How long can the industry endure this trend? If my arithmetic is correct, the industry could drill ⅓ as many wells, and be allowed to produce three times as much oil per day per well, and it would be in about the same position it was in 1953."

—E. B. MILLER, JR.
Vice-president, General Manager
Southern Division
Tidewater Oil Co.

"Our problem is no longer one of finding enough oil. We've found it, and we can find more. Our problem is to find enough of an economic outlet for it to keep us in business, so that we'll be available in an emergency. This means we shall need to understand our problem, to state it so others can understand it, and then to obtain a sympathetic and constructive solution for it. In other words, our problem is one of public relations, and we couldn't have picked a tougher, or a worse starting position from which to tackle it."

—FRANK B. CONSELMAN
Consulting geologist
Abilene, Tex.

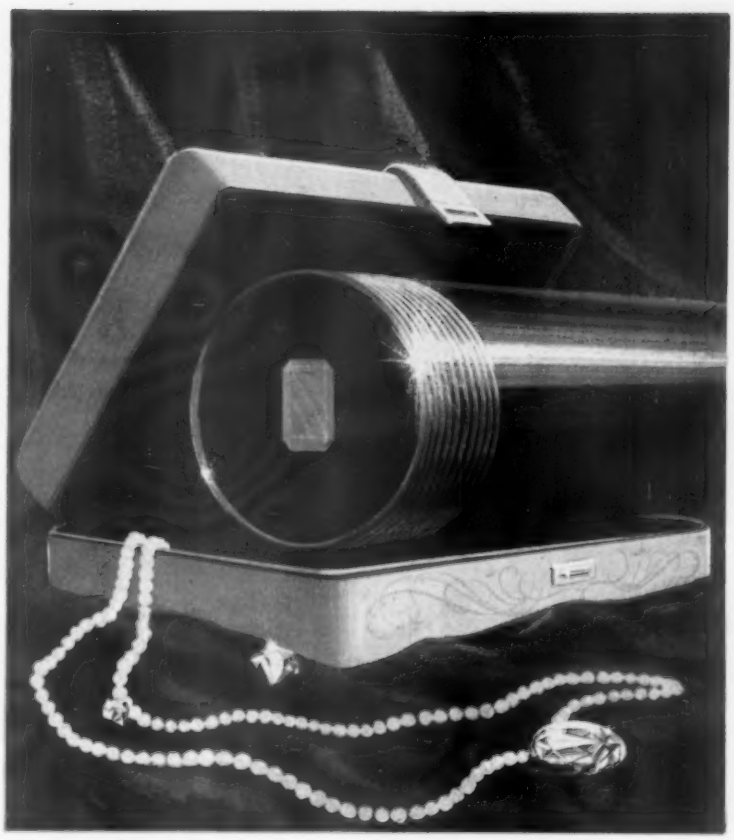
. . . and Letters

Dear Sir:

Your editorial, "Consequences Would Be Disastrous" [PW—Sep.11 '59,p58], was wonderful. You certainly covered all the important possibilities that could come to pass if such a constitutional amendment could be brought about. . . .

I have taken the liberty of mailing copies of this editorial to all the editors of papers in the principal oil producing cities of Oklahoma, with the suggestion that they comment on it editorially. . . . I certainly appreciate the help you are giving the industry on this situation.

GEORGE C. MARTIN
Ass't. General Manager
Rock Island Oil & Refining Co.
Duncan, Okla.



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INDUSTRY

Pipe at Lone Star Steel is made under ideal conditions by craftsmen as exacting as a jewel cutter.

Every facet of Lone Star pipe-making is subjected to repeated inspection to assure a flawless product. Lone Star API casing, tubing and line pipe . . quality protected from mining of ore to finished pipe . . is the hallmark of fine craftsmanship.

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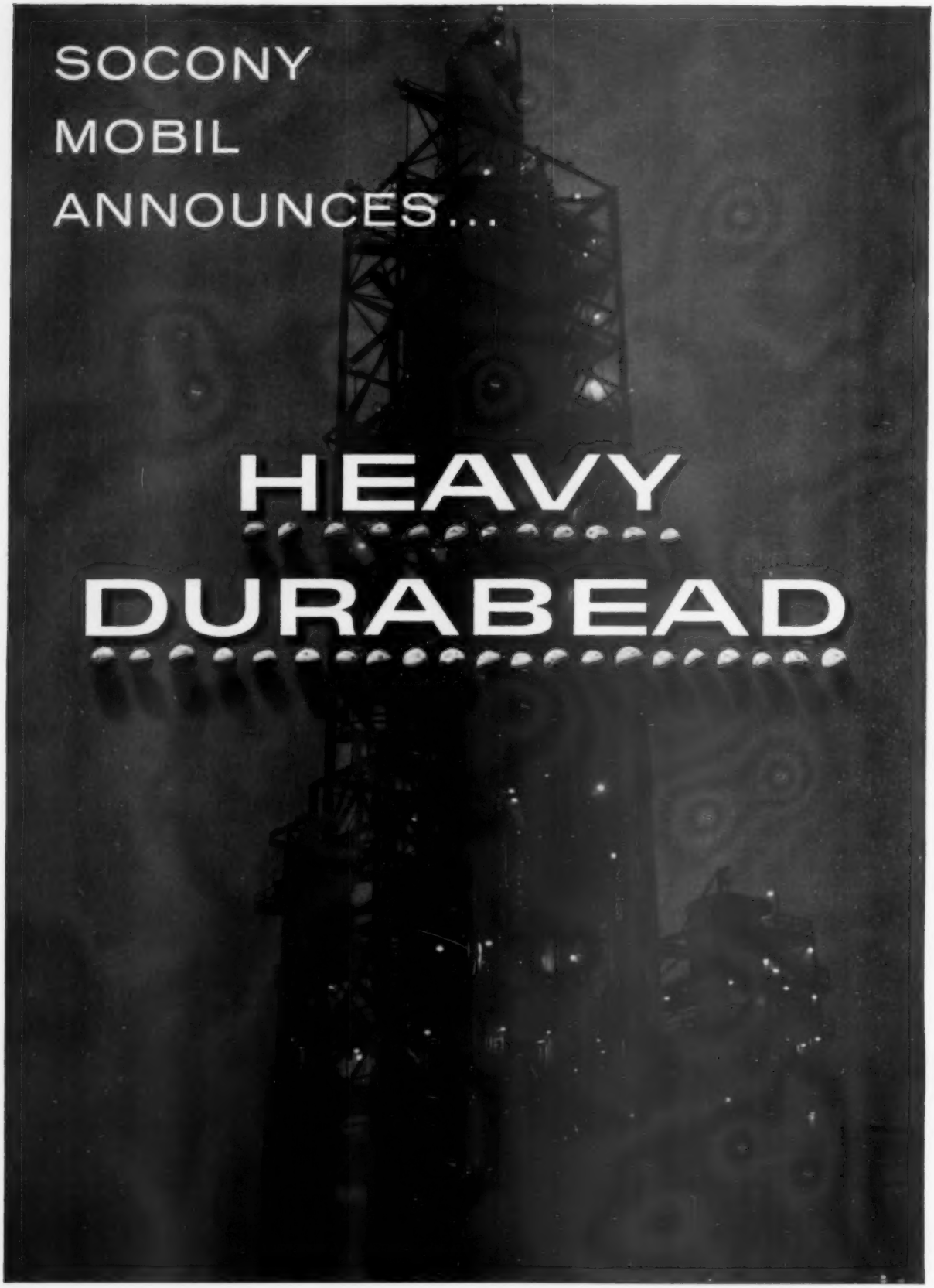
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NOW SOCONY MOBIL'S CATALYST RESEARCH BRINGS YOU:

Lower operating costs
Greater cracking capacity
Reduced construction costs

For years Socony Mobil's scientists have been leaders in catalyst research and engineering. In 1943 they put the first Thermofor Catalytic Cracker on stream. Under wartime pressure they originated and perfected for commercial use the first bead catalyst. With the war over, Socony Mobil researchers continued to improve catalytic refining. By 1950, the Airlift TCC was an accomplished fact. Then in 1957 came Durabead, a bead catalyst that reduced cracking costs, increased refinery efficiency.

Now Socony Mobil catalyst research brings the petroleum industry another important advance—Heavy Durabead!

This new bead catalyst offers all of the advantages of Durabead—plus important new ones. It makes possible construction of TCC units at a 20% reduction in cost. Used in present TCC units, it increases reactor and regenerator capacities as much as 50% compared to chrome bead catalyst.

Once again Socony Mobil leads the way in producing a higher yield of salable products from a barrel of oil—making possible more profit for TCC licensees and operators of other moving bed cat crackers.

To learn more about Heavy Durabead, contact:

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repeat business . . . 3 MAJOR EXPANSIONS AWARDED TO BROWN & ROOT

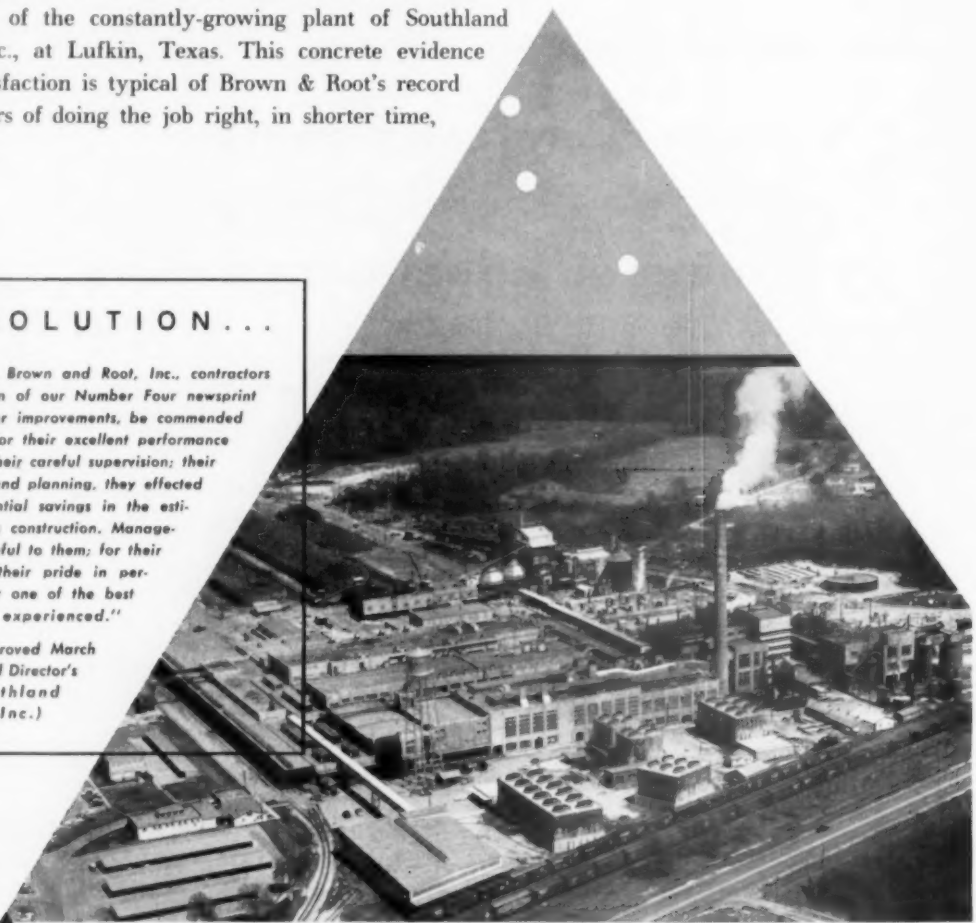
in eleven years

In 1946, and again in 1955 and 1957, Brown & Root was called in for construction of the constantly-growing plant of Southland Paper Mills, Inc., at Lufkin, Texas. This concrete evidence of customer satisfaction is typical of Brown & Root's record through the years of doing the job right, in shorter time, at lower costs.

A RESOLUTION . . .

"RESOLVED, That Brown and Root, Inc., contractors for the installation of our Number Four newsprint machine and other improvements, be commended by Management for their excellent performance rendered us. By their careful supervision; their fine engineering and planning, they effected us a very substantial savings in the estimated cost of the construction. Management is very grateful to them; for their cooperation, for their pride in performance, and for one of the best jobs we have experienced."

(Unanimously approved March 31, 1959 at annual Director's Meeting of Southland Paper Mills, Inc.)



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60-Second Summary / WHAT'S HAPPENING IN OIL

October 9, 1959

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Field tests of a new concept in petroleum marketing are under way in the Midwest. Standard Oil Co. (Ind.) is replacing several neighborhood stations with a single superstation in two pilot communities in an attempt to cut unit costs and boost profit margins. . . . p. 15

•

A major technological breakthrough in drilling will require an entirely new concept of making hole. The finding of a Petroleum Week special study is that not much more can be done to improve present tools. . . . p. 40

•

Texas producers will make a plea for a "fair share" of crude markets at the Railroad Commission hearing next week. They plan to blame the buying practices of the larger companies for loss of markets by Texas oil. . . . p. 17

•

An intensive training program may be the answer to dealer turnover—one of marketing's biggest problems. Sun Oil Co. initiated a program 18 months ago, and has reduced its turnover rate sharply. . . . p. 102

•

The political party in power in Venezuela is growing more hostile to oil companies. It has adopted a "petroleum policy" far stronger than any to date. . . . p. 16

•

Radioisotopes are becoming popular processing tools, now that the industry and public alike are sure of their safety. Prejudice is vanishing, and use of the radioisotopes is speeding solution of difficult problems. . . . p. 76

•

Less-costly drilling can be achieved with present-day equipment by using the optimum combination of bit weight and rotary speed. That's the conclusion of two engineers in a detailed report to AIME's annual meeting. . . . p. 25

•

The Federal Power Commission is still a long way from finding a method to regulate producer gas prices, even though the "Phillips case" arguments are concluded. . . . p. 18

•

When city and oil field boundaries overlap, cooperative discussions can work out an equitable solution. That's what's going on in Odessa, Tex., where the drilling ordinance is being amended to assure harmonious growth for both sides. . . . p. 28

•

Laurel Pipe Line Co.'s remote-controlled products line over the Alleghenies is "over the hump." The kinks have been ironed out, and it has passed a four-month test of heavy operation. . . . p. 82

Up to the Minute / SIGNIFICANT LATE NEWS

AT-A-GLANCE Copyright PETROLEUM WEEK

October 9, 1959

The Oil, Chemical & Atomic Workers Union opened the door this week to possible withdrawal from the AFL-CIO. Its national convention voted unanimously to drop "AFL-CIO" from the union name, and to place full authority for disaffiliation in the hands of the 16-man executive committee.

It has no immediate plans to pull out of the AFL-CIO, however. The convention's objective was to serve warning to the federation that it isn't happy with the way things are going. Its specific actions empowered the executive committee to act independently and swiftly should it decide at any time to terminate relations. Otherwise, a time-consuming special constitutional convention would have been necessary.

The OCAW moves reflect the growing discontent of its officers and membership with the AFL-CIO. Many members are opposed to affiliation, and the jurisdictional disputes with a sister union, the Metal Trades Dept., have fanned the flames of resentment to white heat. Members also question the wisdom of AFL-CIO political activities.

On Wednesday, the convention voted overwhelmingly to change its conventions from an annual to biennial meetings. And an administration program to throw the bulk of the OCAW's field services into a tremendous organization drive was expected to receive enthusiastic approval before the convention ends Saturday.

•

Interior Secretary Fred A. Seaton says conflicting industry-consumer views must be reconciled in any new natural gas bill. He told the American Gas Assn.'s annual meeting this week that enactment of legislation "is a problem without promise of solution" until the conflicts can be resolved. Seaton also took an apparent swipe at the coal industry's program to carve out a portion of the total energy market. He said he could not believe that it would be "appropriate or just for the government to distort the picture by preventing the functioning of normal economic forces."

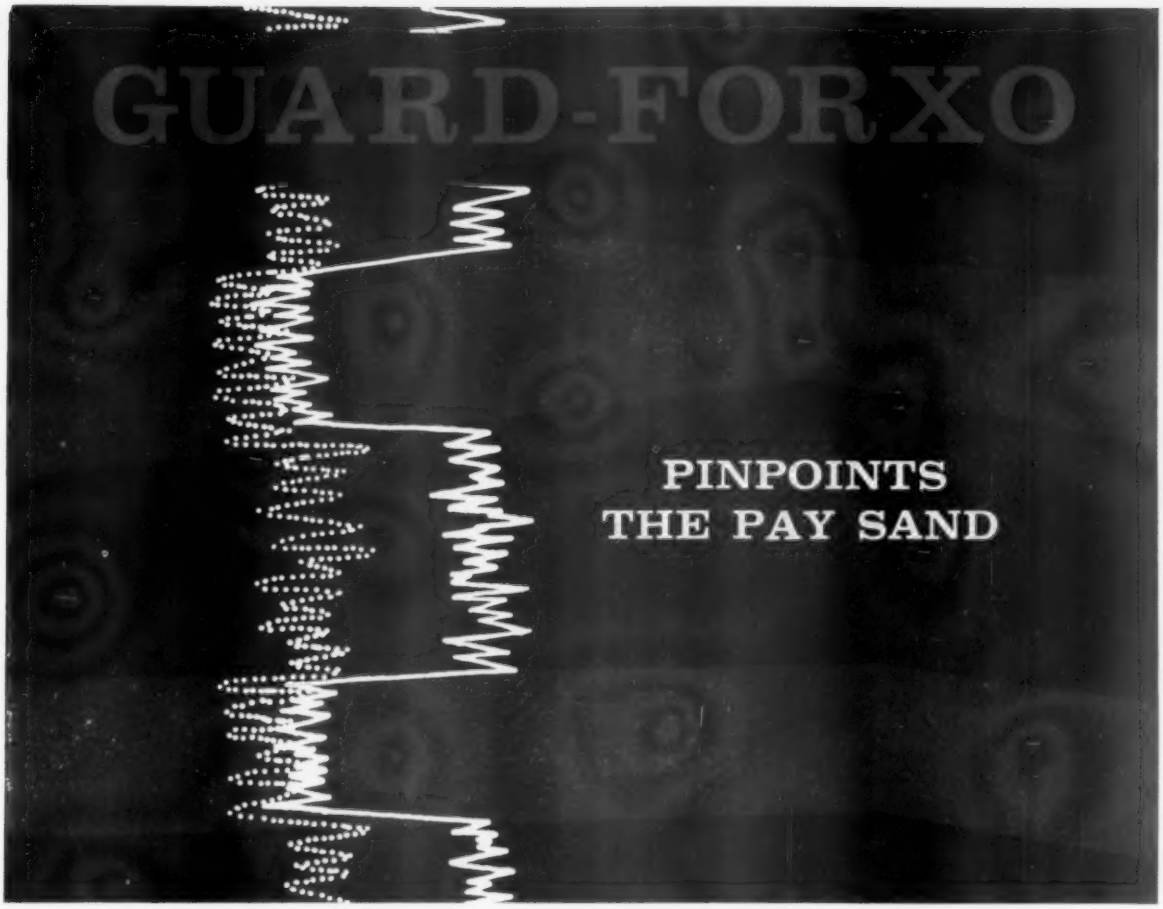
•

The government may be planning some changes in the list of residual fuel oil importers. The Interior Dept. at mid-week was preparing a questionnaire scheduled to be sent to all present resid importers plus about 100 terminal operators. They will be asked to report on monthly stock positions since January, 1957, and to report stocks for future months.

President Eisenhower and Commerce Secretary Mueller advised New Englanders that resid supplies would be "normal" this winter. But a comment by Mueller that New England resid prices had dropped 15¢ a bbl. since the mandatory import plan started does not jibe with market figures.

•

Natural gas service to Michigan Consolidated Gas Co. is being shut off by Panhandle Eastern Pipe Line Co. The action by Panhandle followed a court order which dissolved a stay obtained last August by the Detroit utility. Panhandle is now diverting the gas to other customers, as the climax to a long feud with Michigan Consolidated.



Welex's Guard-FoRxo log makes finding oil easier. If there is a pay sand present, the Guard-FoRxo pinpoints it with precision accuracy. Guesswork and complex computations are minimized. The Guard Log reads the uninvaded zone; the FoRxo measures the flushed zone. A comparison of the two curves results in a positive evaluation of the well, particularly in difficult-to-analyze wells where formation and mud resistivities are similar. Thin beds, shaly sands and rapid lithological changes are easy to analyze with the Guard-FoRxo combination.

No other logging device in the field can record vertical changes in lithology as well as the FoRxo log. No other combination of logs can pinpoint pay sands as accurately as the Welex Guard-FoRxo, particularly where the formation resistivity is similar to the resistivity of the mud.

This is another Welex Production Guide to help the oil man make his own decision with confidence. Contact your nearest Welex representative and let the complete wireline service company give you the finest service in the field today. Call Welex and be sure.

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..... to make net savings of $4.87 per foot

Here's proof of actual savings using Bit Lube (E. P. Additive for Mud). The table below shows a drilling cost comparison in the Brownfield, Texas, area. The Bit Lube well was drilled for $4.87 per foot less than the offset well.

	NO. BITS	BIT SIZE	INTERVAL	ROTATING HOURS	WEIGHT ON BIT	RPM
BIT LUBE-WATER	28	7⅞"	4919-7272	185	70-90,000	60-80
WATER	40	7⅞"	4936-7270	379	45-60,000	55-60

Total savings in bits, trips, and drilling time was $13,420. Bit Lube and emulsifiers cost $1,940; a net saving of $11,480!

Bit Lube forms a tough protective film to reduce friction and to increase bit bearing life under extreme pressure conditions. It works best with high weight on the bit and fast rotary speed. Bit Lube and Magcobar engineering may be the answer to your bearing failures.

Bit Lube is only one of Magcobar's many answers to the problem of high drilling cost, a problem that demands the right answers. You'll find that the right products *used right* by Magcobar can cut costs on your next well, too.

Magcobar
Complete
DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS

59-200

Magcobar Technology !

MR. JOE ZEPPA

President,
Delta Drilling Company

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"Initiative, ingenuity and inventive skill."

"Modern drilling programs continue to become more demanding. Deeper wells, higher pressures and temperatures require the Drilling Contractor to have the finest equipment, top-notch crews and, above all, the know-how to drill a good well economically.

"Progress in oil and gas well drilling would have been much slower without a healthy, competitive contracting industry.

"The Drilling Contractors' feverish search for improvement, coupled with today's technological and equipment advances, make it possible to get the job done faster, under more difficult conditions, with a greater amount of success and at a lower cost per foot.

"Much of the credit for this can be given the equipment and service industries whose continual research and development programs have offered solutions to many of the complex drilling and production problems.

"As a Drilling Contractor, in a highly competitive business, I can attest to the many advances made in our industry. This progress is the result of initiative, ingenuity and inventive skill so typical of the manufacturing, supply and service companies serving us today."

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PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PETROLEUM WEEK
October 9, 1959

Indiana Tests Superstation Plan

- **It is exploring the concept that fewer stations with greater volume and lower unit costs can halt the trend toward declining profit margins.**
- **In two Midwestern communities, it is building two huge experimental outlets that will operate 'round the clock and will replace 11 conventional neighborhood stations.**

Standard Oil Co. (Ind.) is experimenting with a revolutionary concept in petroleum marketing—community "super stations" instead of scattered neighborhood outlets.

The idea behind it all is comparable to the consolidation programs of the big chain grocery stores in recent years.

These firms did away with most of their neighborhood stores, and replaced them with sleek, ultramodern, centrally located supermarkets.

The latter were fewer in number, but they were designed to handle greater volume at lower operating cost, thereby increasing the net profits of the superstores, and thus of the chains themselves.

The Indiana experiment—and it is regarded strictly as an experiment—is to see whether an oil company can do the same with gasoline and other petroleum products and services.

It's bound to excite considerable attention throughout the industry, for it runs counter to the present philosophy of acquiring more and more outlets instead of fewer.

In recent months, many companies have been expanding their horizons by acquisitions and mergers, in a mad scramble to boost volume and dispose of heavy gasoline stocks.

Field tests are under way now in two Midwestern communities, and several others are contemplated.

Pilot operations are being tried out in Vincennes, Ind., population 19,500, and in Fairfield, Iowa, population 8,000.

Other locations said to be under consideration are Mattoon, Ill., whose population is comparable to that of Vincennes; and possibly Wichita, Kan., population 245,000, or Kansas City, Mo., population 515,000.

It is understood that four superstations, in all, will be involved in the unique experiment in marketing research.

In both Vincennes and Fairfield, new vitreous-enamel superstations are being built especially for the field tests. Both are prefabricated models.

The Vincennes station had been scheduled to open last week, but construction delays forced a postponement. The Fairfield station is to be completed soon.

The Mattoon and Wichita-Kansas City projects are still in the discussion stage, so no actual work is under way in any of the three cities.

The experimental superstations are replacing a total of 11 independent and company-leased outlets in the pilot communities.

In Vincennes, nine Indiana stations are being closed down in the city proper. In Fairfield, two will shut their doors when the new station opens.

The novel experiment has one basic objective in mind—to see whether the company can better its profit margin, even though it means reduced gallonage.

The company attitude is said to be based on "dollars, not gallons." Behind this reasoning, according to some industry sources, are the hard facts that marketing profits have been declining despite growing volume.

This leads to the thought that perhaps the best way is to eliminate marginal outlets and concentrate on more efficient distribution through larger stations with greater gallonage and lower unit costs.

Indiana Standard is said to have almost 11% fewer outlets than it did in 1933. But company wide, volume is up better than 20%.

In Milwaukee, Wis., for example, the Indiana company was said to have sold 24 stations and bought a half-dozen new ones. This resulted in an increase in volume of 60%, despite the fewer stations.

This idea of more volume with fewer stations could have been the basis for the superstation experiments.

More than anything else, it demonstrates the pressure that is on marketers to cut costs and better their net earnings.

Iowa has a state tax on chain stores, so this will be another facet to be explored.

It will give the Indiana company an answer to the question of whether it is sound business to consolidate and pay the chain tax, or retain independent and lessee-operated outlets.

Special arrangements have been made to take care of the displaced personnel. The Indiana company, it is understood, made amicable termination deals with the affected stations and their employees.

Some employees, but not all, are being absorbed in the superstation operations. They are being given intensive training in the new marketing concept prior to official openings.

Indiana Standard management, it was learned, is acutely conscious of the dealer morale problem involved in the experiments, and is leaning over backwards so that its dealer relations elsewhere will not be affected.

In Vincennes, supervision of the pilot program is in the hands of J. D. Moyer, Standard's local sales representative.

The district manager is W. D. Jackson, who, with Mayor L. T. Wampier, participated in a ground-breaking ceremony for the new superstation.

Jackson says Vincennes was selected because of its size, physical layout, stability of economic conditions, industrial strength, and the "progressive-mindedness of its civic leaders."

Fred Roos, Standard's district manager at Davenport, Iowa, is overseeing

the Fairfield test. The station itself is to be comanaged by the two lessee dealers whose outlets are being closed.

Like Vincennes, Fairfield was chosen because of its special characteristics and stability.

The new superstations incorporate modern design and techniques, and some innovations in their appearance.

Location is of prime importance, so both stations are in the best possible sites for traffic and accessibility.

The Vincennes station will operate 24 hours a day, and the advance word is that it will offer "the most complete services available anywhere for the motorist."

It will have three service bays, no canopy, and a new type of lighting.

The Fairfield station is being constructed of porcelain-enameled steel, inside and out. Storage facilities are baked-enamel steel, with illumination built into the units.

It'll have a remote pumping system, three pump islands, and a tank capacity said to be in the neighborhood of 12,000 gal.

Rest rooms will be in colored ceramic tile of the latest design. An asphalt parking area of 5,000-sq. ft. will adjoin the station.

The gasoline pumps at one station are said to be the blending type that Sun Oil Co. introduced in eastern markets several years ago. But whether this means that Indiana is contemplating a pump-blending operation as another phase of its field tests is conjectural at this time.

Unofficial word is that the pumps, for the time being, will be used as orthodox dispensers. In other words, they'll function like regular units, and there'll be no blending for the present.

The superstation approach will have no effect on fuel oil deliveries and rural customers, however.

In Vincennes, fuel oil and rural customers will continue to get their supplies and services from the bulk plant. In Fairfield, they'll be served from the new station.

Other companies are keeping an eye on Indiana's field tests. They are maintaining a discreet silence, however, while waiting to see how they work out.

Indiana officials are maintaining an official silence too, limiting their announcements to the affected areas for hometown consumption.

PETROLEUM COMMENTS

By Wanda M. Jablonski

Venezuelan Policy Statement Jolts Industry

CARACAS—The oil industry was jolted sharply here last week when the government's political party adopted a "petroleum policy" far more hostile in tone to American and other foreign oil companies than any official government statement to date.

The oil policy statement was included in a series of resolutions approved at the end of the national convention of the big Accion Democratica (AD) party, which gave President Romulo Betancourt a resounding renewed vote of confidence.

The oil resolution was adopted after the AD meeting heard at a private presentation of the government's oil policy from Dr. Juan Pablo Perez Alfonzo, Minister of Mines & Hydrocarbons.

While Perez Alfonzo's presentation has not been made public thus far, observers here had little doubt that it must have been closely in line with the final AD resolution, which repeatedly praised the policy and "thesis" of "our fellow party member Perez Alfonzo."

* * * *

The text of the oil policy resolution, as made public last week, made these three main points:

(1) Perez Alfonzo's thesis in insisting in Washington that the U.S. assign a country-of-origin oil import quota to Venezuela is a "most useful tool in the strategy against oil imperialism."

"To be able to negotiate our petroleum exports by means of treaties fixing the quotas only modifiable through bilateral discussions means to snatch from imperialism its so-far exclusive prerogative of establishing volumes and terms," the statement added.

Apparently assuming that the U.S. is dependent on imports from Venezuela, it remarked: "Perez Alfonzo's thesis has been put forward at an opportune time, because the U. S. cannot, just like that, close the door to Venezuelan petroleum exports, inasmuch as its increasing demand is not backed by adequate reserves."

(2) It recommended that the proposed national oil company be set up as a purely governmental unit and be granted a monopoly of the local market. To this end, it urges that the new company take over the government's small Petroquimica refinery and expand its capacity to cover total Venezuelan consumption.

This statement, it is noted here, is in direct contradiction of repeated public statements by Perez Alfonzo reassuring oil companies that the government company would not be given any preferences or advantages over the private companies.

(3) The policy statement approved Perez Alfonzo's price-control policies as "efficient and realistic." It also commended his efforts to reach agreement with Middle East governments to "divide markets, set common price policies, reopen tax rates, and even simultaneously create national oil companies." It says there are "no insurmountable difficulties" in reaching agreement with the countries of the Middle East on these points in future conferences to be held with them.

(The full text of the Accion Democratica policy statement will be found on page 90.)

Texans to Ask 'Fair Share' of Market

The issue of "loss of markets" for crude is scheduled to be aired by independent producers at next Friday's statewide hearing of the Texas Railroad Commission.

The views of several independent producer groups in the state have been coordinated and will be presented by the State Action Committee, representing the various producer organizations. It is headed by Tom G. Medders, Jr., of Wichita Falls.

The producers' concern is that so far Texas has borne the brunt of the cutbacks in production to keep supply in balance with demand, and that the state can't be expected to continue to do so indefinitely.

One of the producer groups wrote the "top management of the leading 30 integrated companies" that, unless action is taken to avert the economic hardship imposed on Texas producers, "not only survival of the domestic independent producer, but the preservation of free competitive enterprise, may be at stake."

That's the view of the Texas Independent Producers & Royalty Owners Assn., but it is echoed by others.

Since 1952, TIPRO noted, the Texas share of the national output of crude has dropped from 44% to about 36% now.

Ernest O. Thompson, chairman of the commission, says it's time for purchasing companies "to show some tendency" to be fair in their decisions on where to take their oil.

Preliminary production figures of the American Petroleum Institute show that domestic output in September averaged 244,410 b/d under a year earlier.

Output in Texas in September was down 383,550 b/d from last year. And production in nine other leading states was off a total of 155,200 b/d.

But ten other states increased production by 242,450 b/d.

The producers are pointing the finger at the major purchasing companies—not the states where production has increased sharply.

September production in Louisiana, for example, was 113,100 b/d over a year earlier, and in some of the smaller producing states the percentage gain has been much higher.

But, the producers argue, in the major states at least, the purchasing companies, by their nominations, in effect determine the volume of crude production.

TIPRO notes that if, during the summer months, purchasers had cut back their crude take in other states by the same percentage as Texas production was cut (about 12.1% under the May level), then current inventories of all oils would be around 49-million bbl. lower—or just about at the "desirable" level.

But undoubtedly, some states may come in for criticism, particularly those states where oil is purchased by Texas refiners.

Producers say that if Texas refiners had reduced their take from nearby states by the same percentage as production was cut in Texas last summer, Texas would have been able to "hold close to a fair share of the national crude market."

NEXT WEEK in Petroleum Week

What's ahead for petroleum companies in Venezuela? The official in a position to know, Dr. Juan Pablo Perez Alfonzo, Minister of Mines & Hydrocarbons, outlines his policy on American newcomers, oil pricing, proration, tax incentives, and the issue of a national oil company in an exclusive interview with Wanda M. Jablonski, starting next week.

Sid Richardson: A Man of Legend

Sid Richardson is gone. But the legends about him will live on. His life story is a rags-to-riches saga that even a contemporary Horatio Alger couldn't top.

Richardson, the "billionaire bachelor" of Fort Worth, and reputedly one of the world's wealthiest men, died last week at the age of 68 in his home on an island off the Texas coast.

At the time of his death, several companies, including Indiana Standard's Pan American Petroleum Corp., were studying some of Richardson's holdings.

He started in the oil business as a supply salesman and oil scout and wound up as one of its more fabulous figures.

He was born in modest circumstances on an Athens (Tex.) farm, and got his name from an itinerant evangelist.

He disliked personal publicity. Yet he was a personal friend of President Eisenhower and the late President Roosevelt.

He lived quietly and unostentatiously. His home was unpretentious, even though he owned the 29-mi.-long island on which it was located.

Twice in his lifetime, he suffered severe financial reverses. Then he lived on credit, and often remarked that he "even shot jackrabbits to eat." But each time he came back, and eventually amassed millions.

His personal fortune, in recent years, has been estimated at $200-million, with probably another $500-million worth of oil in underground reserves.

In addition to his oil wells, he owned and operated four cattle ranches. He owned a refinery, too, and at his death, his possessions included one of the world's largest carbon black plants.

His business interests extended far beyond the oil patch, however, and in some of them he was associated with Clint W. Murchison, Sr., of Dallas, another extraordinary entrepreneur of oil.

One of the more fascinating stories about Richardson involves the New York Central R.R. In 1954, to help fellow-Texan Robert R. Young win control of the Central, he and Murchison picked up $20-million worth of stock.

Thirty minutes after he made the deal, he reputedly asked: "What the hell is the name of that railroad again?"

Gas Price Plan Is Still a Long Way Off

The "final" arguments are in on the key Phillips case, but conflicting recommendations on how to regulate producer rates means no early decision.

Members of the Federal Power Commission this week started sifting through a mass of conflicting recommendations on how to regulate producers' natural gas prices.

Five years ago, the U.S. Supreme Court asserted that FPC had jurisdiction over producer prices—specifically, prices of Phillips Petroleum Co. Six months ago, an examiner proposed that Phillips' prices be set along the lines of utility regulation: by determining the company's cost of service, adding a percentage rate of return, and allowing the company to set uniform sales prices (PW—Apr.10'59, p9).

The first producer price case—involving Phillips Petroleum—went to the commissioners late last week after seven hours of final oral argument by the interested parties.

The commission heard 17 different presentations of the case—by Phillips, the FPC staff, and intervening pipeline companies, utilities, and state regulatory bodies.

Almost all participants in the case agree that costs of service recommended by FPC Examiner Joseph C. Zwerdling should be the starting point in determining Phillips' rates. But there is a vast area of disagreement on how to figure costs.

Many independent gas producers—particularly smaller ones—object to the costs method. But no small producer is represented in the Phillips case and that segment of the industry is, for the time being at least, without a voice.

Phillips, although it supports the cost-of-service theory in its own case, says it has taken no position on the plan's workability for the entire producing industry.

The commission, if it accepts the near-unanimous recommendation to start with costs, will be faced with a dozen different ideas on the subject.

Phillips, for example, wants to include the tax credit for percentage depletion and intangible drilling when figuring costs.

Zwerdling had considered both tax features and would not allow the inclusion of such tax credits when totaling the company's costs.

Most of the intervenors oppose Phillips' proposals on tax treatment, and side with Zwerdling.

At the oral arguments, Luke B. Land, representing the FPC staff, told the Commission: "It's one thing to allow a company tax benefits and another thing to allow them to include it in the rate base."

The majority of distribution companies and state regulatory bodies also supported Zwerdling. A State of Wisconsin attorney said there is no ground for any claim "that Phillips is entitled to phantom taxes in its cost of service."

Phillips maintained the ground was evident, and cited a recent FPC decision involving El Paso Natural Gas Co. In that case, FPC allowed El Paso to take advantage of its tax savings in figuring costs, but simultaneously reduced the company's rate of return.

Phillips, however, believes the commission's El Paso principle will not work for it unless the company can have the higher rate base independent of a rate of return.

Another sharp disagreement confronting the commissioners is on allocation of joint exploration and production expenses between oil and gas.

Zwerdling would allocate only 30% of the costs to gas, while Phillips wants 60%. Again, most of the intervenors side with the examiner.

Phillips claims the "reserves-added realization method," adopted by Zwerdling, contains too many errors for use. Basically, the method allocates joint exploration costs between oil and gas in proportion to the value of oil reserves discovered in a recent period, as compared to the value of gas reserves discovered in the same period.

Phillips determined its allocation of exploration costs on the basis of relative Btu. value produced.

The company contends that, even using Zwerdling's method of allocation, gas costs would be 50% if royalties were not overvalued and an excessive value not placed on reserves sold in place.

Still another FPC problem will be

Explosion Rips Esso Gasoline Tank

An Esso Standard Oil Co. gasoline tank erupted last week in Charleston, S. C., and burned for two days. C. W. Matthews, bulk plant superintendent, says the initial blast occurred in "an open area," and a "blue ball of fire" jumped to the tank. About 3-million gal. of gasoline went up in flames, threatening nearby tanks. The fire was eventually confined to the one tank by pumping foam in at the top and bottom of the tank. Esso estimates the damage at $150,000.

The company at mid-week was still investigating the causes of the explosion. Off-the-cuff speculation in Charleston is that Hurricane Gracie weakened the tank walls, and the escaping fumes were ignited by some unknown source.

that of determining a rate of return on investment. Phillips has asked for a 12% rate, in addition to the tax savings.

Zwerdling recommended a 9.25% rate without tax credits.

FPC, if it does determine and use a costs base, then would have to decide how to apply it. Phillips says the examiner's plan would fix rates for all future sales.

The company wants FPC to determine its costs, then allow it to negotiate at arm's length with customers to gain revenues to meet its costs, including the rate of return.

The cost of service determined by Phillips would require gas sales at about 18.8¢ per Mcf.; by the examiner, at 11.66¢.

Although most intervenors agree with the examiner on figuring costs, many differ on where to apply prices.

In this area—whether to set prices uniformly for the entire Phillips system, or to establish area-by-area prices—Phillips and the examiner are in agreement.

The examiner and Phillips prefer the "postage stamp" plan: common prices for all company sales. The FPC staff wants differential area pricing.

Most of the state regulatory agencies and local utilities in the case agree with the staff. It is at this point that Phillips says the intervenors leave the camp of utility regulation. The company sees utility-type control as a system of establishing costs, setting a rate of return, and applying the price to all sales.

The bulky case brings other problems to FPC: California utilities and the state Public Utilities Commission want FPC to ban spiral escalation clauses in Phillips' gas sales contracts as illegal.

Purchasing pipelines companies, such as Northern Natural, want Phillips held to present contract prices.

The FPC staff wants to reopen hearings on the case.

But the regulation-minded staff has frequently been rebuffed by the commissioners, who are somewhat more conservative in regulator matters. Thus, observers believe the commission will ignore the staff's request.

The commission is expected to take up to a year to decide the Phillips case. And once FPC does rule, the case will certainly go to court.

Warns Engineers Against Unions

Petroleum engineers were warned this week that union groups are presenting a serious challenge to their status as professional men.

"Right now, we are losing the game [on the national political level] by default," E. A. Hartsook, of Standard Oil Co. of California, told the annual meeting of the Society of Petroleum Engineers, AIME, in Dallas. Unions now claim more than 10,000 engineers, he said.

He told the meeting that unions have launched major programs to reach young people in schools before professional societies can get to them.

Professional men were urged to abandon their traditional aloofness from political problems because "the very fundamentals of our way of life are being attacked."

The increasing political activity of unions, Hartsook said, makes it imperative, that engineers wake up to what is going on, and take an active interest in attempting to reverse the trend.

Sporadic efforts are being made by local groups, but the engineers were told that those are not enough—that there must be a coordinated program and a strong voice.

Hartsook outlined a three-point program, which included a call for a Public & Government Relations Committee.

Gas Expects High Capital Spending

The gas industry expects its capital spending to more than double by 1970.

It is slated to climb from $1.9-billion in 1959 to $4.3-billion in 1970, according to long-term projection of gas industry operating statistics by the American Gas Assn. The current year's expenditures are up 14% over last year.

For the most part, according to AGA, the data "represent extrapolations of past trends, modified to reflect the influence of likely changes in the economic characteristics of the gas industry."

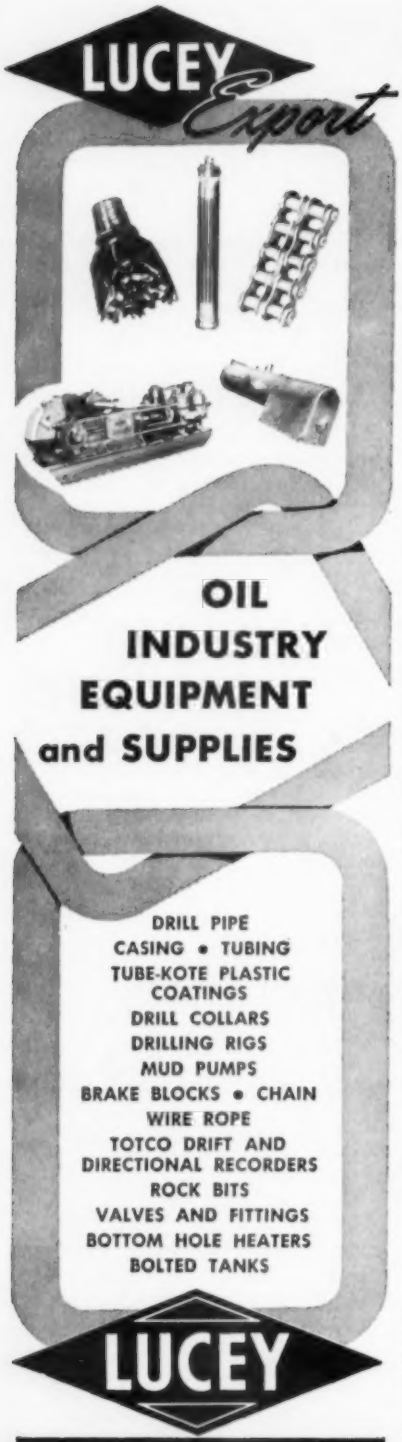
Transmission will still account for the biggest chunk of capital spending: $2.1-billion in 1970 versus $809-million in 1959. AGA also estimates that there will be 911,500 mi. of pipeline in place by 1970, 282,400 mi. of which will be main-trunk transmission lines. The latter figure represents a 70% gain over 1958 mileage.

The biggest percentage boost in outlays, however, will be for development of underground gas storage. Such outlays will almost triple, from $115-million this year to $318-million in 1970.

(millions of dollars)

Year	Total Spending	Production	Transmission	Storage	Distribution	Others	Gross Plant Investment
1958	1,618	218	715	73	541	71	18,070
1959	1,859	210	809	115	648	77	19,743
1960	1,898	212	775	118	716	77	21,451
1961	1,977	171	915	112	700	79	23,230
1962	2,166	190	1,025	123	730	98	25,179
1963	2,397	192	1,166	144	789	106	27,336
1964	2,707	237	1,316	164	875	115	29,772
1965	2,968	273	1,419	185	965	126	32,443
1966	3,190	293	1,543	214	1,005	135	35,314
1967	3,371	323	1,626	237	1,042	143	38,348
1968	3,713	392	1,809	262	1,093	157	41,690
1969	3,908	431	1,905	289	1,118	165	45,207
1970	4,254	479	2,089	318	1,188	180	49,036

Gross plant investment is slated to climb roughly 150% in the same period, rising from $19.7-billion in 1959 to $49.0-billion by 1970.



What's New / IN THE INDUSTRY

A potential fight over the issue of ratable take in Texas apparently ended before it started. A purchaser agreement to take the oil in question prior to a Railroad Commission hearing undoubtedly will lead the commission to dismiss the complaint filed by a group of San Angelo producers. They had charged that crude purchasers refused to take oil from their discovery between Halff and Clara Couch pools in Crockett County. Texaco Inc. said it would take the disputed crude, thus averting what some observers felt would be a significant test of whether purchasers could deny a ratable share of the market to new oil. Five producer and royalty owner associations had sought to intervene in the case.

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A court battle is shaping up in the Denver (Colo.) gasoline price war. Oriental Refining Co. has filed suit for an injunction to prohibit virtually every Denver dealer from selling gasoline below cost. The suit cited a Colorado statute barring the sale of goods below cost or for the purpose of injuring competition. Early this week, major-brand stations were down to 13.9% a gal. for regular grade (ex taxes), and private brands were as low as 10.9¢.

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Interprovincial Pipe Line Co. is undertaking a $9.3-million construction program in 1960. The company says it anticipates increases in 1961 crude demand in markets served by its Edmonton-Superior pipeline system. Plans include four new pumping stations—two in Manitoba, and the others in Wisconsin. Work is to be started next spring and completed before the year ends.

•

No end is in sight in the fight over markets and increased gas allowables from the Hugoton (Kan.) field. A Kansas Corporation Commission hearing last week reviewed all issues in the 3½-year-old fight. One test case involving the old law still is pending before the Kansas Supreme Court, and another that will challenge the new law is anticipated. The disagreements revolve around the commission's authority to consider interstate market and supply factors in setting allowables.

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Hughes Tool Co. has charged Reed Roller Bit Co. with four separate rock-bit patent infringements. The suit, filed in federal district court in Houston, seeks to enjoin Reed from manufacturing bits incorporating certain design features. Reed officials say they have not had time to make a legal reply, but deny the allegations.

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Attorney General Will Wilson feels the time has come to "call a halt" to oil company centralization. He said the petroleum industry has reached the point where further mergers may call for antitrust action.

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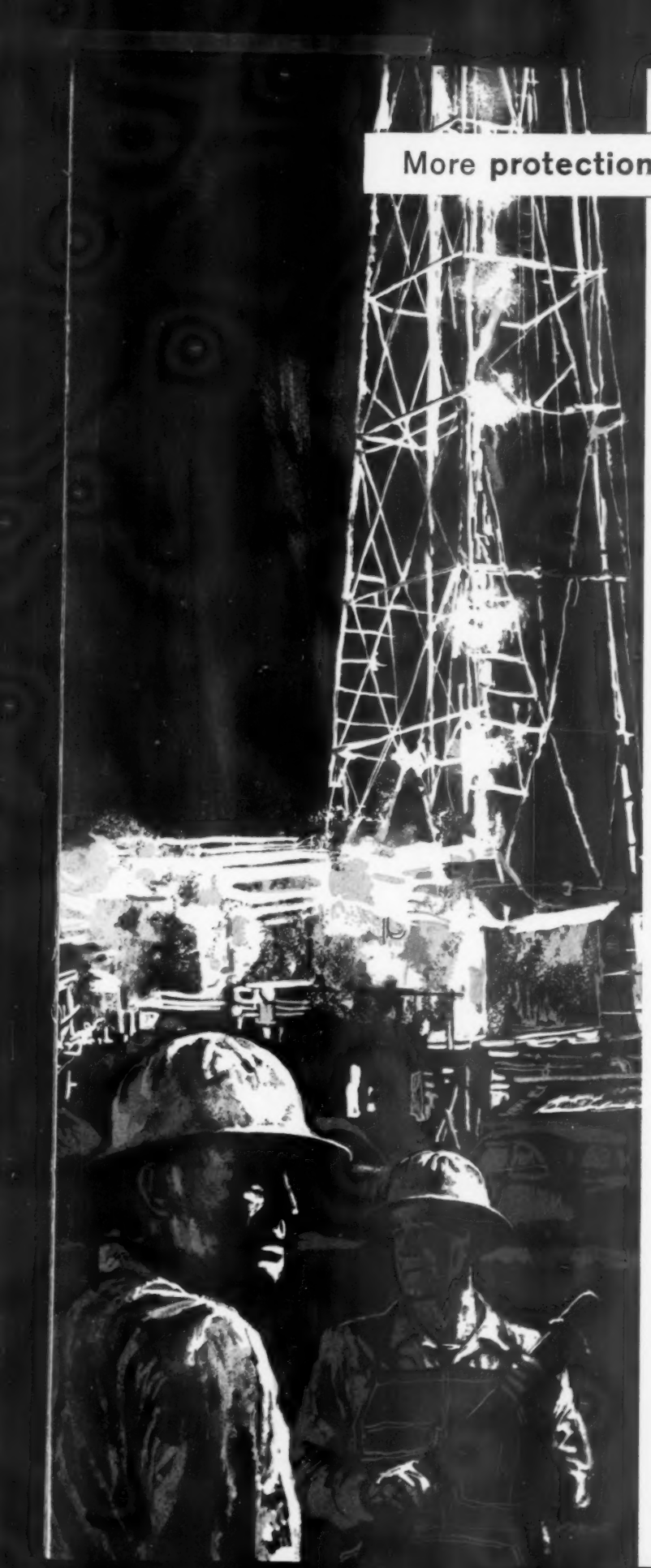
Wayne E. Glenn, of Continental Oil Co., is the 1960 president of the Society of Petroleum Engineers, AIME. Glenn, Conoco's manager of production, succeeds John S. Bell, of Humble Oil & Refining Co. The Society gave its John Franklin Carll Award to Eugene A. Stephenson, professor emeritus, University of Kansas; the Cedric K. Ferguson award to H. J. Ramey, of General Petroleum Corp.; and the Anthony F. Lucas gold medal to John T. Hayward, consultant on offshore drilling.



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Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
October 9, 1959

The long-awaited "final" arguments on federal and state offshore boundaries will be heard by the Supreme Court next week. The arguments will climax years of debate and legal maneuvering. Legally, the matter before the court is a motion of the Justice Dept. seeking to restrict the offshore areas of five Gulf Coast states to a maximum of 3 mi. into the Gulf of Mexico. The states claim a minimum of three leagues, or 10.5 mi.

The "intent" of Congress in passing the Submerged Lands Act of 1953 will be a major point in the arguments. The Supreme Court ruled in 1950 that the U. S. had "paramount rights" in the area. Since that time, the issue of boundaries and ownership has been up in the air. The legislation passed three years later did nothing to clear up the confusion. The law said the coastal states owned submerged lands with their "historic boundaries." It did not define those boundaries.

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The present case was originally brought by the U. S. against Louisiana in 1955. Later, Texas sought to enter the case as an intervenor, and the Supreme Court then approved an amended federal complaint against the five states. Louisiana in 1956 attempted to take claim to the lands in a state court suit, but the Supreme Court enjoined that action. New leasing or drilling in the Louisiana area was prohibited except by agreement filed with the court.

Almost $140-million is tied up in escrow—money from lease fees—which will eventually go either to the U. S. or Louisiana, under the terms of an agreement filed with the court. As of June 30, the amount was $139,768,047.19.

The arguments will start Monday and continue for three or four days. The court has allocated four hours for argument on points involving all the states, and nine hours for individual situations.

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Here's the lineup: The U. S. vs. Louisiana, Texas, Mississippi, Alabama, and Florida. Arguing for the state group on common questions will be James P. Hart, former state supreme court justice of Texas; J. C. Dougherty, special assistant attorney general of Texas and a veteran offshore expert; and Louisiana Atty. Gen. Jack P. F. Gremillion. Speaking for the individual states will be Gov. Price Daniel and Atty. Gen. Will Wilson of Texas; Victor A. Sachse of Louisiana; Gov. Joe T. Patterson of Mississippi; Assistant Atty. Gen. Gordon Madison of Alabama; and Atty. Gen. Richard W. Ervin and Sen. Spessard L. Holland of Florida.

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Two Supreme Court justices are expected to excuse themselves from the case. They are chief Justice Earl Warren, former governor of California, and Justice Tom Clark, who was U. S. Attorney General when the submerged lands first became an issue.

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The Court probably will rule before its current term ends in June, 1960. But there is an outside chance that the justices may ask to hear more arguments, and push any decision over until the next term.

DELROYD
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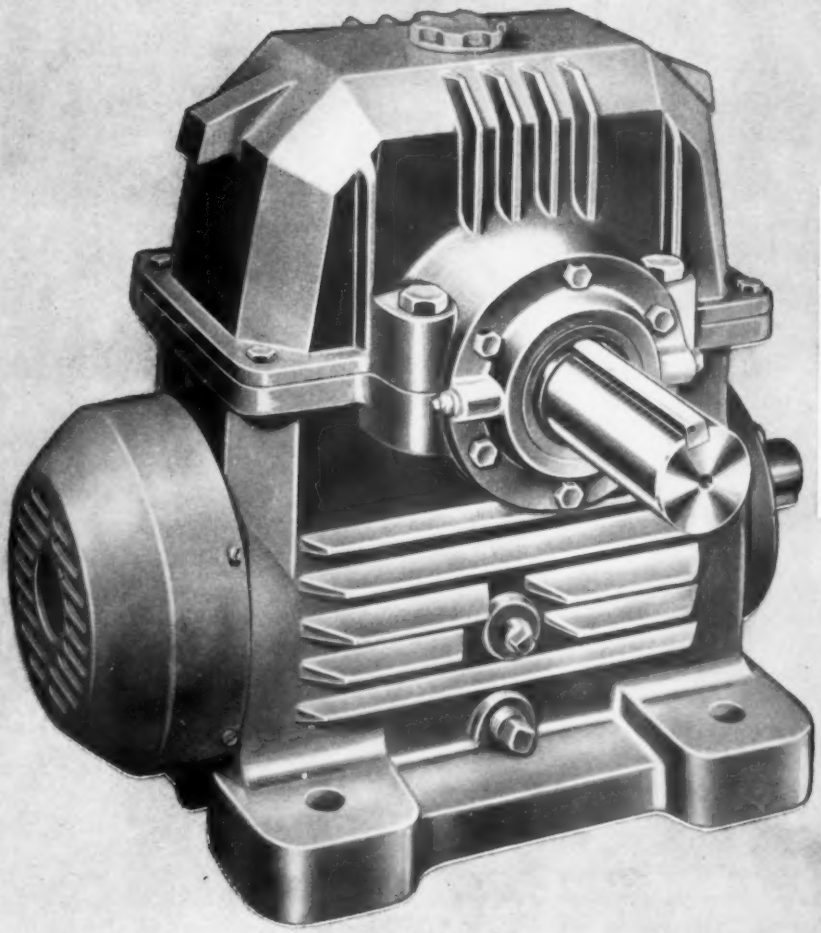
De Laval Announces All New Line of Single Reduction Speed Reducers



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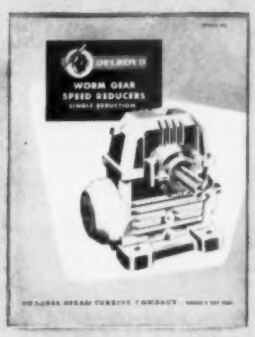

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Set at 19,425 feet in 7-inch casing, this Retainer Production Packer was milled over in two hours and fifty minutes, and the cast-iron body and bottom of packer retrieved without damage to 4½-inch liner just below it.

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Better, Cheaper Drilling Is Possible

- **Use of the optimum combination of bit weight and rotary speed can lead to lowest-cost drilling.**
- **Jet-bit programs can now be designed to make maximum use of available pumping equipment.**
- **There also is a new understanding of the impact of such variables as tooth pressure, tooth angle, and drilling-fluid pressure on rock fracture in drilling.**

It's possible to approach the minimum total drilling cost with present-day equipment if optimum combinations of bit weight and rotary speed are used.

This is the basic conclusion of a study made by J. W. Graham and N. L. Muench, both of Humble Oil & Refining Co.

In their study, Graham and Muench assumed that total drilling cost can be expressed as the sum of rig cost for making round trips, rig cost for drilling, and bit cost. They further assumed that bit life is limited by bearing failure, that bit weight is not limited by such factors as hole deviations, and that drilling hydraulics are adequate.

At depth intervals from 1,000 ft. to 6,000 ft., high bit weights (in excess of 50,000 lb. at 75 rpm.) are needed to approach the minimum total drilling cost, the Humble engineers maintain.

The recommended optimum bit weight is assumed to be reached, according to Graham and Muench, when drilling cost is reduced by less than 1¢ per ft. for each 1,000-lb. increase in bit weight.

Their mathematical analysis, based on records of various field tests, shows that for rotary speeds ranging from 50 rpm. to 100 rpm., bit weights from 50,000 lb. to 95,000 lb. (depending on drilling depth and rotary speed) should be used.

"These bit weights are significantly higher than the 30,000 to 45,000 lb. which have been used often under drilling conditions similar to those assumed in the example," they said.

For a rotary speed of 75 rpm. and for bit weights less than about 45,000 lb., drilling cost increases rapidly as bit weight is decreased, they continued.

And for a rotary speed of 75 rpm., the optimum bit weight increases from 56,000 lb. to 78,000 lb. as drilling depth increases from 1,000 ft. to 6,000 ft.

There are many optimum combinations of bit weight and rotary speed for any particular depth. This is so because for every rotary speed there is a corresponding optimum bit weight, according to Graham and Muench.

The two noted that the operator can select any convenient rotary speed, provided that he uses the bit weight that is optimum for that selected speed. Drilling cost, they added, "is relatively insensitive to the particular optimum combination that is used."

The optimum combination of bit weight and rotary speed is strongly dependent on rig cost and bit-bearing life, they added.

At a rotary speed of 75 rpm., for example, with all conditions except rig cost remaining constant, a change in rig cost of from $720 a day to $2,400 a day increases the recommended optimum bit weight from 61,000 lb. to 96,000 lb., they reported.

Graham and Muench reported their findings at this week's meeting of the Society of Petroleum Engineers, AIME, in Dallas. Their paper was one of several dealing with drilling cost as related to drilling rates and methods.

A graphic method for designing jet-bit programs that make efficient use of surface power has been devised.

H. A. Kendall and W. C. Goins, Jr., both of Gulf Research & Development Co., told SPE that, while rig hydraulics has become increasingly prominent during the past decade, opinion has varied as to which hydraulic quantity has the greatest effect on drilling rate—pump horsepower, bit hydraulic horsepower, jet impact force, or jet velocity.

Results of this, they said, include: (1) there has been no method of designing jet-bit programs that provide maximum bit hydraulic effects from surface to total depth; (2) it has been impossible to test the different bit hydraulic effects; and (3) there has been no way to assure the most effective use of the pumps.

Their report shows the maximum obtainable bit horsepower, impact force, and jet velocity at all depths, taking into account the limitations of the pumps, piping, hole, and minimum circulating rate for adequate removal of cuttings.

The Gulf Research engineers have developed ranges of operations, and specified flow rates, surface pressure, and bit pressures for each range, to provide a maximum of any one of the desired effects.

The graphic method devised for selecting nozzle sizes and flow rates can be used with company hydraulic tables and calculators to design jet-bit programs for maximum bit hydraulic horsepower, impact, or jet velocity, as desired.

Maximum bit-hydraulic benefits are gained from increased pump operating pressure, rather than from increased flow rate of horsepower, Kendall and Goins concluded.

This is so, they added, irrespective of whether the best drilling effects are to be gained from designing jet programs for bit horsepower, impact, or jet velocity.

Here are some other conclusions of their study:

- An increase in pump horsepower will often be of no benefit in deep drilling, but an increase in pressure rating can be utilized in bit hydraulic effects at any depth.
- For maximum bit hydraulic effects, the nozzle sizes should be selected to use, in combination with pipe circulating pressure, all the available pressure of the pumps.
- The difference in flow rates and jet velocities when designing for maximum jet velocity, bit hydraulic horsepower, or impact, may be considerable; and it is important to detemine through field tests which programs result in the fastest drilling rate.

The volume of rock that can be broken during drilling is a function of the tooth pressure and angle, the drilling-fluid pressure, and formation characteristics, according to H. D. Outmans, of Union Oil Co. of California. Outmans told SPE that this re-

lationship exists if fracturing is preceded by plastic flow—an assumption that can be verified.

By relating the cutting volume to the drilling rate, the hydraulic bit horsepower, and the drilling-fluid pressure, he added, it is possible to arrive at formulas which express the drilling rate for viscous or turbulent flow at the cutting surface, or for false tooth foundering, as functions of such variables as the drilling-fluid pressure, hydraulic horsepower at the bit, rotary speed, and bit weight.

Some other conclusions in Outmans' theoretical approach include:

- The highest drilling rate may be obtained with the smallest tooth angle that will provide sufficient strain to ensure fracture along the extreme flow lines, provided the tooth spacing remains the same.
- The effect of the pressure of a nonpenetrating drilling fluid is twofold: (1) It increases the strain required for optimum fracturing; and (2) it reduces tooth penetration.
- For low bit weights, the drilling rate is approximately proportional to the square of the bit weight; at higher bit weights the relation tends to become linear. The harder the rock, or the higher the mud pressure, the higher the bit weight at which this gradual transition occurs.

Nuclear Magnetic Log Developed

A new method of logging that measures the nuclear magnetism of formation fluids has been developed.

Successful measurements have been made with a research model of the tool in wells in California, Texas, Utah, Louisiana, and Wyoming during the past year and a half.

A cooperative research program on the nuclear magnetic log has been carried out by Borg-Warner Corp.'s Research Center and Byron Jackson Division, and by California Research Corp.

R. J. S. Brown, of California Research, and B. W. Gamson, of B-W's Research Center, reported on the new development at this week's meeting of the Society of Petroleum Engineers, AIME, in Dallas.

Tests so far indicate that the nuclear magnetic log can be used in all known formations except those which are strongly magnetic.

Brown and Gamson said the new log is of special interest because "it offers a way of making direct measurements on the hydrogen in the formation fluids and not on the rock matrix."

The log operates equally well in water- or oil-base muds, and in empty holes, they said.

Two separate measurements are made. One provides a continuous formation-fluid curve—the Free Fluid Log (FFL)—and the other may help distinguish oil and water zones.

The two engineers said that the FFL delineates fluid-containing zones and generally may be used as a minimum effective porosity index. They added: "The FFL is an excellent correlation curve which can be obtained under many of the conditions where conventional correlation logs are ineffective."

The preliminary tests indicate that the second kind of NML measurement may also provide information concerning permeability and wettability, besides distinguishing between oil and water zones, they reported.

The NML has been run in about 40 wells so far. Meaningful data, Brown and Gamson reported, were obtained in 20 of them. Ten of the wells gave inadequate data because of initial difficulties with the equipment, while in another 10 the data were of limited value because of the limited occurrence of reservoir rocks.

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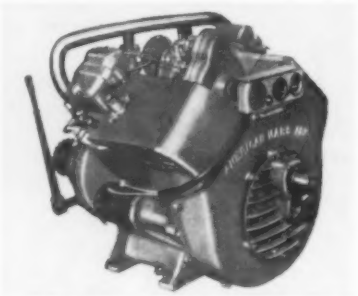

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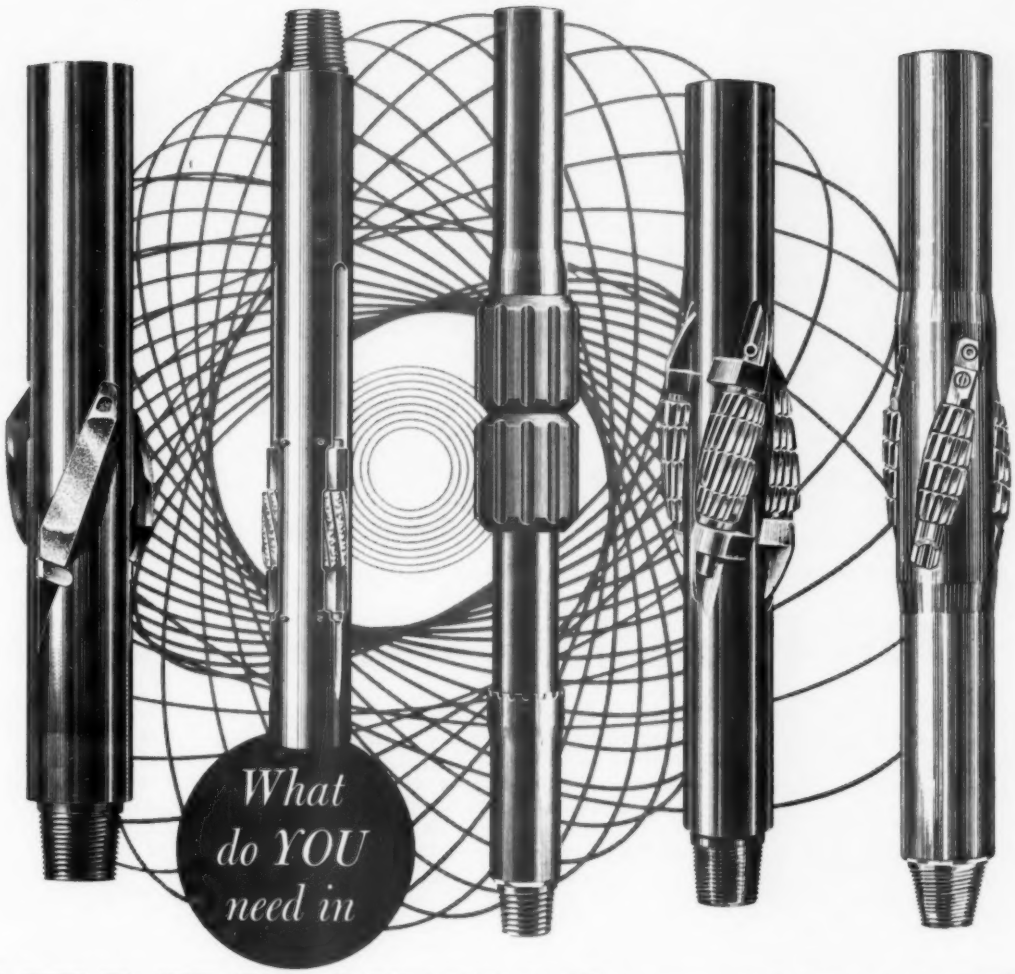

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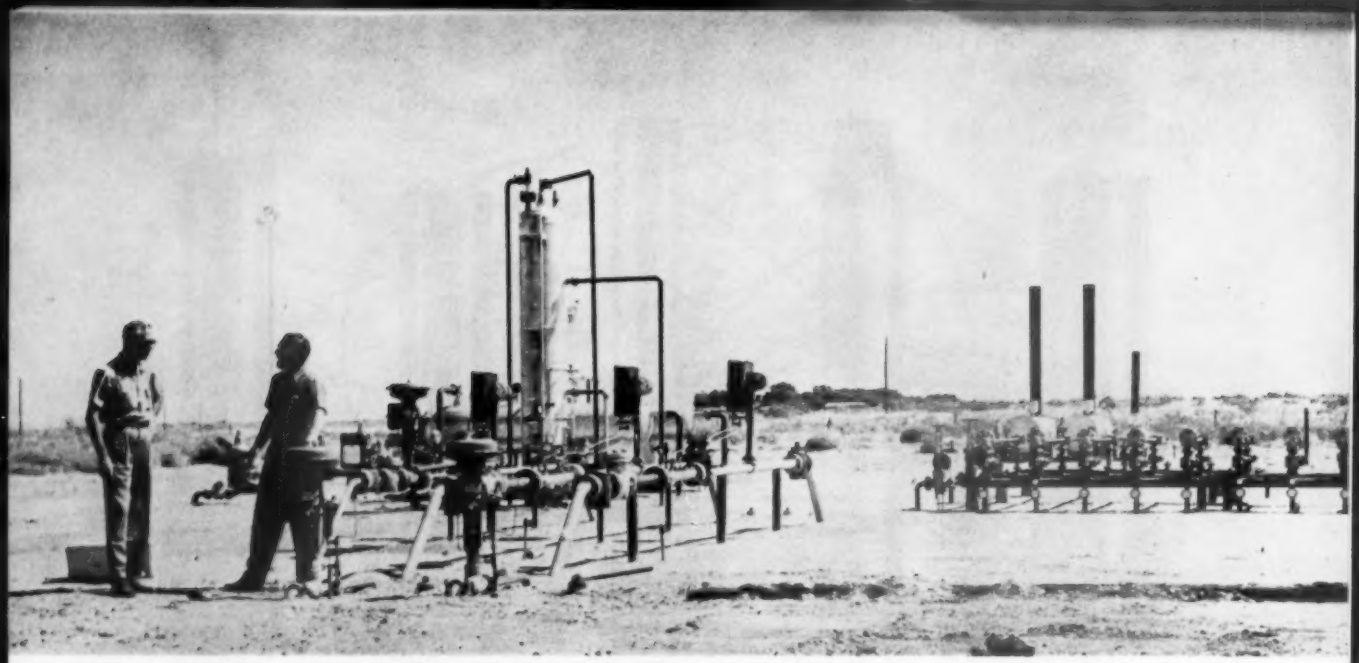

BLOCK STATION in Headlee Devonian Unit, West Texas, where crude from several wells is gathered for gas-liquid separation.

Oil Companies and City Council

The Odessa (Tex.) City Council is expected to amend its drilling ordinance soon to assure harmonious growth of both the city and an oil field.

The revision will mark an almost text-book example of cooperation—in this case between the city fathers on one side and oil company officials and land owners of the huge Headlee Devonian Unit on the other.

For several months, oil company officials have been meeting with city officials to work out a drilling ordinance that will provide safety for Odessa citizens and at the same time be flexible enough to allow the oil companies to operate effectively.

The need for a revised drilling ordinance rises from Odessa's growth eastward and the Headlee Devonian Unit's spread westward.

At present, there are eight blocks of the unit inside the city limits. And the city council is considering taking in portions of several other blocks.

There are 11 wells inside the city, of which two are planned to be injection wells as part of the gas pressure maintenance program being conducted in the unit.

An oil company spokesman, however, said there won't be more than five injection wells inside the city within the foreseeable future.

These wells—which inject gas at about 5,000 psi. and have a compressor intake pressure of 1,500 psi.—are the primary reason behind the move to amend the drilling ordinance.

The problem came into focus when Texas Gulf Producing Co.—unit operator—told the city it planned to build a high-pressure injection unit near a proposed school site.

"At the time," says Malvern G. McDonald, Odessa city attorney, "we felt there was a dire misunderstanding. After we met with the oil companies, however, and talked it over, we found we really didn't have a misunderstanding at all."

After talking the situation over with city officials, the oil companies have decided to move the injection facilities.

One of the issues to be resolved by the new ordinance is how much acreage will be devoted to the injection sites within the city.

Industry sources believe the ordinance will call for an oval site of slightly less than 11 acres, which will be surrounded by chain-link fences to keep out children and animals.

A concrete block fence on the injection-well compressor sites also has been proposed, for both beautification and safety purposes.

Producing well sites in residential areas will average four to five acres, and the Christmas trees probably will be enclosed in small housings, an oil company spokesman said.

All pipelines within the city will have to be buried 3 to 4 ft. beneath the surface.

And applications to operate lines in excess of 250 psi. probably will require details and specifications of safety provisions and equipment, such as automatic high-low-pressure shutoff valves, check valves, and schedules of pipe.

City officials appear pleased with the way the program is being handled.

"The Headlee Devonian Unit is a fine thing for Odessa," says McDonald. "We're an oil town and we know it. We are trying to find out what type of ordinances the oil companies can live with, and are working along these lines."

On the other hand, the oil companies are appreciative of the attitude the city has taken.

"The attitude of the city in allow-

One Example of How Cooperation is Won

Here's one way that Texas Gulf Producing Co. has helped build up good will with the officials and citizens of Odessa:

A well being worked over near a golf course on the outskirts of the town recently blew out, spraying salt water over a portion of the course and several trees.

Texas Gulf immediately washed the area down with fresh water to prevent damage from the brine.

The company says no complaints have been received from the owners of the golf course.

INJECTION WELLS, like this one, are leading to changes in Odessa city ordinance.

Join Forces for Mutual Growth

ing us to carry out our program is of great benefit to us because we can execute our plans according to the best engineering principles," says H. W. Hull, division manager of Texas Gulf.

A total of 17 new wells—13 for production and 4 for injection—are planned for the 15,810-acre unit in 1960.

In addition to these 17, the operator anticipates 13 workovers next year.

With these additions, the field will have a total of 110 wells.

Plans call for 23 injection wells, 74 producing wells, and 13 shut-in wells by the end of 1960.

Most of the wells planned for 1960 will be within city limits.

Additions also are planned for (1) the Headlee Devonian Unit plant, including processing facilities for 50% propane recovery, (2) field pipe lines, (3) injection facilities, including five injection compressor units, and (4) production facilities, including block stations and flow lines.

The unit also plans to spend up to $100,000 for additional roadways, land acquisition, and safety precautions relative to Odessa's residential development.

Some expansion is planned for the processing and separating facilities.

The $2,837,000 gas processing plant, with 15-million cf/d capacity, is a straight adsorption type.

An expenditure of $150,000 for a gathering system and minor plant additions is planned.

The plant is owned jointly by the Headlee Devonian Unit and the individual owners in the field who produce from the Ellenburger, Strawn, and Bend formations in the field.

The Unit has recently started a 40-million cf/d separation plant, which handles only the Headlee Devonian Unit production.

It separates the Devonian reservoir fluids in block stations in the field. The gas separated in the block stations goes to the Headlee Devonian Unit plant where it is dehydrated only, returned to distribution systems, and then pumped into the injection wells.

The high-pressure separator liquids go to the Devonian Unit plant, where they are flashed through four-stage separator units. The flash liquid goes through an automatic custody transfer unit—25,000 b/d capacity—into the pipeline.

The flash gas from the separator unit goes to the Headlee gas processing plant.

All residue gas from this plant goes into the injection system.

Total operating expenses of the unit will amount to about $3-million next year.

This includes $2-million for producing and injection wells, gas purchases, and operating costs for the separation plant, and $1-million for production and ad valorem taxes.

Total capital expenditures will be about $9-million.

The total revenue of $12-million expected next year will come from the sale of 4.3-million bbl. of oil and from plant products sales.

The field has expanded greatly since the unit was formed, in 1957.

In December, 1957, there were 30 unit wells, of which 17 were producing, 10 were shut-in, and three were for injection.

Subsequent unit growth has increased the total number of wells as of March 1, 1959, to 83, of which 46 were producing, 29 were shut-in, and 8 were for injection.

The cumulative Headlee Devonian Unit production from Dec. 1, 1957 to July 1, 1959, was 1,831,000 bbl. of oil.

At the time of unitization, it was estimated that 20-million bbl. could be recovered by primary methods and an additional 82.2-million bbl. through unitized gas injection.

The original oil in place in the field was estimated to be 152,228,820 bbl.

Working interests in the unit include 11 companies and 6 individuals.

The companies are Atlantic Refining Co., Austral Oil Co., British-American Oil Producing Co., Gulf Oil Corp., Union Oil Co. of California, Texaco-Seaboard, Inc., Southland Royalty Co., Texaco Inc., Texas Gulf, Tidewater Oil Co., and U.S. Smelting, Refining & Mining Co.

Individuals include Herman Brown, Barbara B. Castleman as receiver for W. P. Castleman, Jake L. Hamon, Phil E. Laughlin, Phil E. Laughlin and Gary B. Laughlin, and P. R. Rutherford.

Perforating Tools, Methods Improved

Reducing the number of perforations in wells to be fractured gives better control of the frac treatment and cuts completion costs, according to B. J. Bucy, of Western Co.

Bucy says determining the number of perforations that should be used has been a problem ever since it became the practice to set casing through the pay zones.

He told the Society of Petroleum Engineers, AIME, in Dallas this week, that early studies indicated pay zones should be perforated from top to bottom with a density of 8 to 16 shots per foot so that production would not be seriously restricted.

This range assumed ideal conditions and radial-flow drainage, Bucy added. But in actual practice, he continued, such factors as proration, formation permeability, and the like, also determine actual productivity.

It became the normal field practice, therefore, to perforate from top to bottom of the pay zones at a reduced density of four shots per foot.

The optimum number of perforations can be determined by mathematical equations, Bucy said.

Reduction of the number of perforations, he said, has two opposing effects on completion costs: (1) perforating costs are reduced; and (2) perforation friction costs increase.

"At some point, called the optimum point, the combination of the two costs reaches a minimum. This point can be determined by deriving equations for each cost and then combining the equations," Bucy said.

To obtain top production by means of perforated completions, it's necessary to follow careful practices and use properly designed equipment, a three-man team from Jet Research, Inc., reported.

R. L. Robinson, R. F. Hatfield, and Pete De Frank told SPE that production equal to or greater than open-hole completions is possible through perforated completions if the flow paths throughout the perforations are free of obstructions.

The engineers noted that, while many factors can reduce fluid flow through a perforation, the deposition of debris from the perforating process is the only factor controllable by the perforator. All other mechanisms are controlled by the operator.

They added that the permanent well-completion technique of perforating with the differential pressure toward the wellbore is a major factor in the elimination of perforation plugging.

The researchers also described a shaped charge that does not create a carrot in the process of jet formation, yet produces a deep, large-volume perforation with no obstruction to flow. A key point in this charge is a liner made of preformed copper particles bonded together.

Perforation of multiple-tubingless completions may be effected with a debris-free retrievable shaped charge gun by either of two recently-developed directional perforating methods, according to M. P. Lebourg and W. T. Bell, of Schlumberger Well Surveying Corp.

These new methods are: (1) a mechanical orienting device, and (2) a self-orienting radiation device.

The two reported that the latter method conceivably could be adapted to the directional perforating of upper zones in conventional dual and triple completions without removal of production tubing and packers.

Lebourg and Bell said the mechan-

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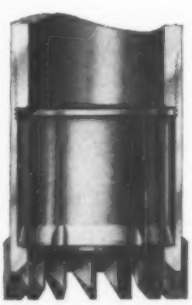

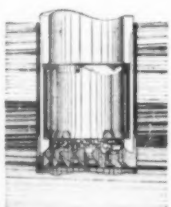

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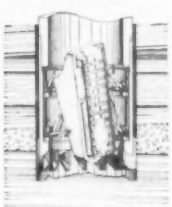

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ical orienting device, which was developed first, has one principal limitation: Only those zones where a mandrel has been set and cemented in place can be perforated.

The self-orienting radiation method, they added, requires no downhole auxiliary equipment and has, therefore, proved more versatile.

The perforating of multiple-tubingless completions also has entailed development of a new 2-in. O. D. shaped charge gun that is debris-free. The gun has a "scalloped" design which reduces the amount of metal in the carrier through which the jet must penetrate.

Alberta Operators Get Tax Break

Alberta's removal of the limitation on the number of oil and gas reservations that can be held at one time has brightened the income tax picure for operators.

The limitation restricted to two the number of reservations that could be held by any one person or company at any one time. It was removed last month by the Alberta government on the recommendation of the Canadian Petroleum Assn., in a letter to Premier E. C. Manning, who also serves as Mines and Minerals Minister.

As a result, there no longer is any need for the formation of "paper companies" to acquire land.

Under the old restriction, once an operator got two reservations by application, any more had to be assigned to a third party, or the third party had to make the application.

Such assignments have been very commonplace.

A favorite means of acquiring more land was to establish paper companies solely for this purpose.

Some of the paper companies were short-lived, while others have remained intact.

The assignment of reservations to third parties prevented operators from realizing the full benefits of deductions allowed under the federal income tax law.

In making its request, CPA called attention to a conflict between provincial restrictions on reservations and the Dominion of Canada Income Tax Act which made it impossible in most cases for the operator to get the deduction benefits to which he was entitled.

Under the income tax act, a payment for a reservation qualified as a deduction only if the qualifying corporation or other organization had surrendered all of the rights in question without any consideration or repayment before a well came into commercial production.

Such deductions naturally could be claimed only by the party that actually paid for and received the reservation.

CPA pointed out that the restriction to two reservations was in effect some years before the federal requirement that at least 50% of the lands had to be left as Crown Reserves when the reservation was converted to lease.

"It is, therefore, respectfully suggested that the remedy for this conflict is to repeal" the reservation restriction "in order that a person may hold any number of reservations by application," rather than just two, CPA concluded.

What the change will mean in cash is not readily estimated.

It will vary from case to case, depending on the amount paid for the reservation in question.

The industry-wide total undoubtedly will involve a substantial amount of money, but no specific estimates are available.

The change is the first in the oil and gas regulations act, except for minor details, since 1948.

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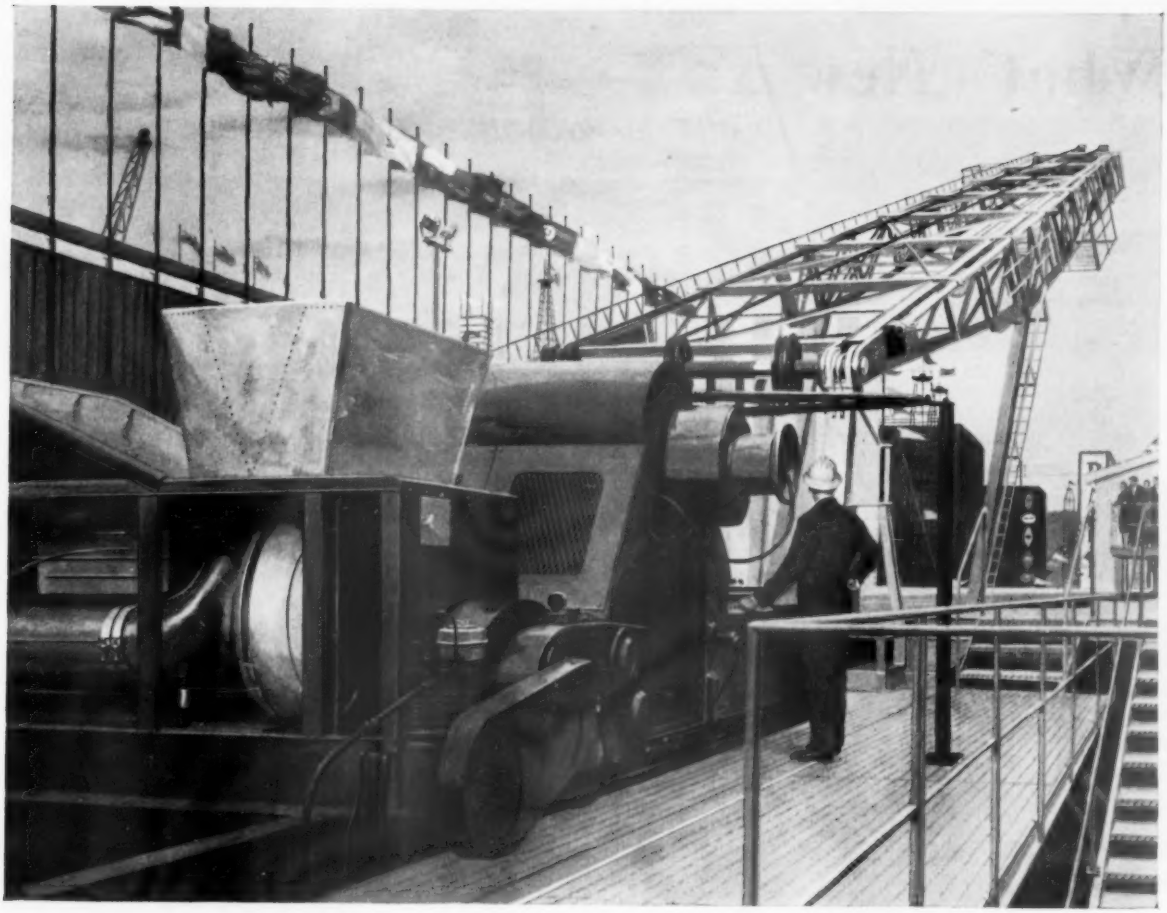

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Solar gas turbine powers mobile drill rig

HIT OF THE RECENT International Petroleum Exposition was a trailer-mounted 5500 foot drilling rig — powered by Solar's lightweight 500 hp *Jupiter*® gas turbine engine.

The basic *Jupiter* engine occupies only 71 cubic feet. It weighs far less and takes considerably less space than conventional engines of similar horsepower. The turbine is air-cooled, eliminating water problems for both desert and cold-area operations. It reaches peak operational efficiency in 35 seconds — without warmup — in temperatures from –65F to 135F. And it can burn almost any type of fuel including gasoline, kerosene, diesel fuel and natural or manufactured gas.

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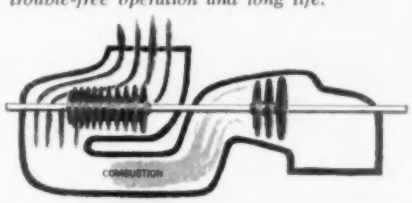

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Oil companies apparently will have to use means other than copyright to protect their maps, because of a decision last week by a U.S. District judge in Houston.

In a case involving the alleged theft of maps from Humble Oil & Refining Co., Judge Joe Ingraham noted that the copyright on the basic maps was held by Edgar Tobin Aerial Survey Co., and that Tobin permits its customers who buy the maps to reproduce them.

Under those circumstances, the judge ruled, the copyright owner cannot control the sale of published copies of the map after the first purchaser receives them. Since companies habitually place their own data on the basic maps and cannot copyright the finished version without making public the information, the decision apparently nullifies the protective effect of copyrights.

•

Richfield Oil Corp. (L.A.) is adding a new twist to its development of natural resources: It's building a home for fish.

The company currently is collecting old car bodies to build an underwater reef near its man-made island off Rincon Point, Ventura County, Calif.

The reef will have no effect on oil production from the 1,175-acre lease, says Richfield, but it "will increase the fish population and provide a fine fishing spot for anglers."

"Wherever it is practical," the company says, "we want to develop properties under our control in such a way that the most people will get the most good from the natural resources."

Similar projects off the coasts of Alabama and Texas have been found to boost the fish population considerably.

•

The rotary percussion tool should stimulate air drilling, according to three engineers from Pan American Petroleum Corp.

Speaking this week in Dallas before the Society of Petroleum Engineers of AIME, G. C. Howard, R. P. Vincent, and L. B. Wilder, reported that wherever air drilling is economical, percussion drilling will further decrease costs.

This additional saving, they said, "should increase the number of wells in which it is profitable to drill with air instead of with liquid-base drilling fluids."

They said nine field tests showed that percussion drilling had penetration rates averaging 2.5 times faster than conventional rotary gas drilling and five times faster than rotary mud drilling.

Bit footage with rotary percussion drilling has averaged 1.3 to 4 times that of air rotary drilling.

Rotary percussion air drilling, they said, is approximately $1 per ft. cheaper than rotary air drilling.

A percussion drill developed by Pan Am from a basic design by Bassinger Tool Co., and being manufactured by Mission Mfg. Co., was used in the tests (PW—May22'59,p24).

•

A British Columbia restriction on out-of-province trucks could dampen plans for stepped-up drilling operations this winter in the north and northeast parts of the province.

The Canadian Assn. of Oilwell Drilling Contractors is meeting with B.C. officials in hopes of easing the restriction.

The B.C. rule, adopted this summer, allows such vehicles to make only one journey into or through the province, under a permit valid for just 30 days.

Maximum number of permits is limited to two per year.

This, say the contractors, means they will have to use B.C. trucks, and there reportedly are not enough to take care of the job.

•

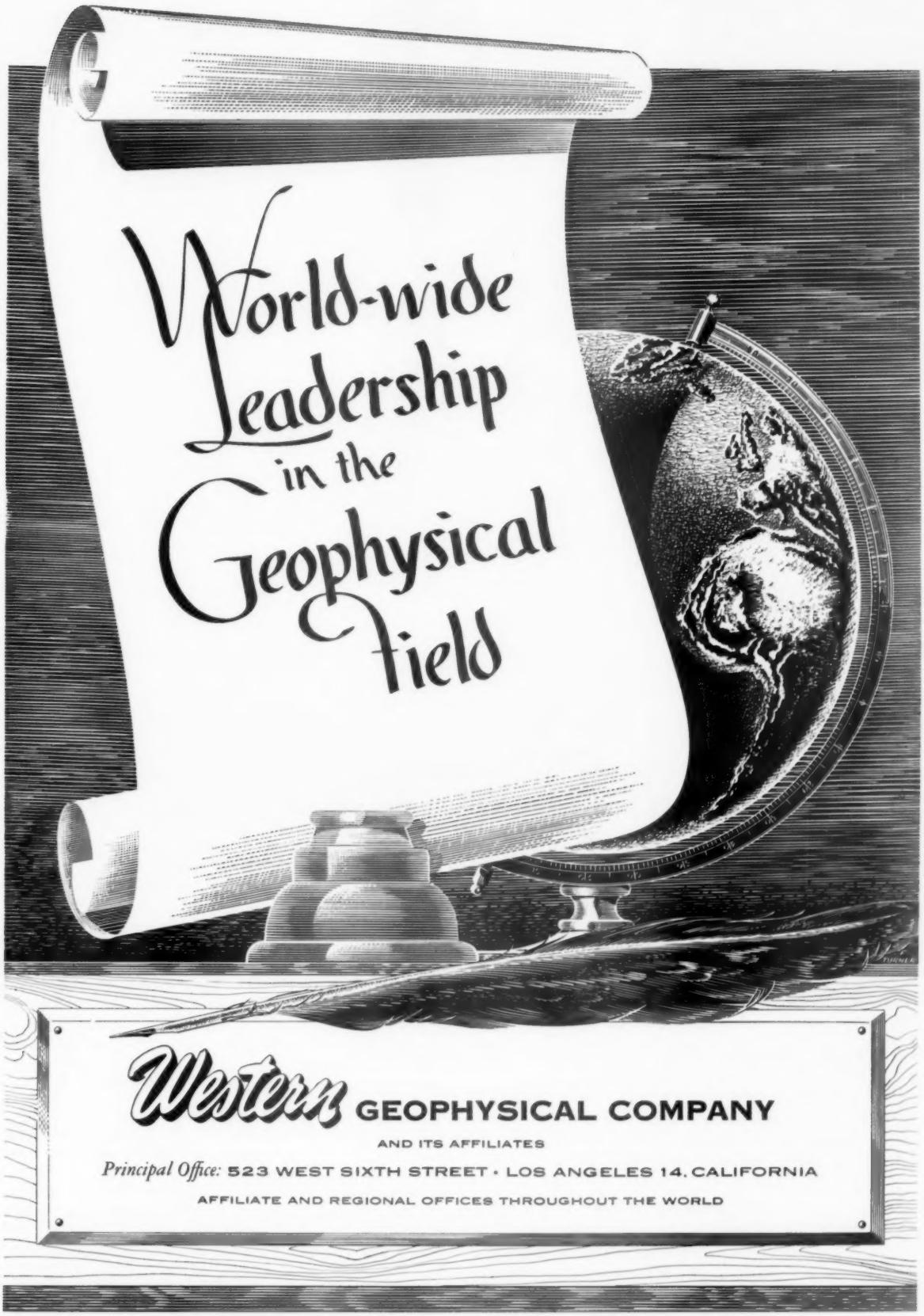
California offshore drilling platforms will get names instead of numbers as part of a new identification program started by the Offshore Operations Committee of the Western Oil & Gas Assn.

Under the plan, the California coastline from the international border to a point near Point Arguello, will be blocked off in series of "bands" about 15 mi. wide.

Each of these bands will be designated alphabetically. The platform

Texas U. Starts Well Completion Seminar

The University of Texas seminar on "Modern Well Completion" started last week with three service company executives as speakers. Standing with Paul D. Torrey, organizer of the course (second from left), are (l. to r.) E. F. Stratton, operations vice-president, Schlumberger Well Surveying Corp.; O. H. Hammer, operating vice-president, Dresser Industries, Inc.; and L. B. Meaders, president, Halliburton Oil Well Cementing Co. Sixteen service company engineers are scheduled as speakers in the seminar, which is designed to give petroleum engineering students an inside view of oil production practices.



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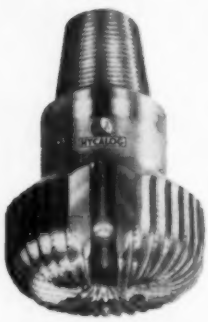

Diamond drill bits were formerly handicapped in duration of runs . . . *and rate of penetration* . . . by their inability to dispose of cores formed at their centers.

In shales and other soft formations, the core twisted off and rotated with the bit.

In hard sands the core crushed the center diamonds, preventing further drilling.

BUT HYCALOG'S ENGINEERS have turned these handicaps into an advantage. Now, the V-DOOR bit, developed by HYCALOG, utilizes *controlled failing* of cores to achieve a faster rate of penetration . . . *and longer life*. HERE'S HOW:

The diamond surfaced center hole purposely cuts a cylindrical core. Valve action of core against bit reduces escape of fluid through the V-DOOR . . . forces it over the cutting surfaces keeping them thoroughly flushed.

Combination of bit design and hydraulic pressure breaks core into short segments. Then valve action is momentarily interrupted; high pressure fluid is released with a surge into V-DOOR port, forcing core fragments into discharge port.

Core fragments are flushed out of hole. With every revolution, the V-DOOR port sweeps bottom of the hole removing loose small particles, and eliminating necessity of regrinding.

Ask your HYCALOG rep to show you some performance records on the V-DOOR. He has a stack of them. *And also get the facts on* HYCALOG *well logging.*

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names—to be one or two syllables—will start with the letter of the alphabet given to the "band" where the drilling site is located.

•

An additional 7-million bbl. of oil is expected to be recovered from a 5,000-acre waterflood in Caprock-Queen field, Chaves County, N.M.

Flooding of the unitized area began last week, with Cities Service Oil Co. as operator.

There presently are 111 wells in the project area, and plans call for the drilling of 11 additional holes for water injection.

•

The subsidence rate is declining in areas of heavy water injection in California's Wilmington field, according to a report from the Long Beach Harbor Dept. Engineers. The report shows:

- No subsidence occurred from August, 1958, to August, 1959, at the south end of Pier A.
- The subsidence rate was cut in half in a large area extending to the south end of the Long Beach Naval Shipyard.
- In the downtown area, the rate of sinkage fell off to an annual count of 0.1 to 0.2 ft., and the center of the subsidence bowl declined only 0.9 ft. —the first time since 1946 that the rate has been less than 1 ft.

•

Standard Oil Co. of California plans to spend $3-million next year for exploration in Alaska.

R. G. Follis, board chairman, also says the company is currently drawing up agreements for a unit operation in the Soldotna area, which would comprise more than 70,000 acres.

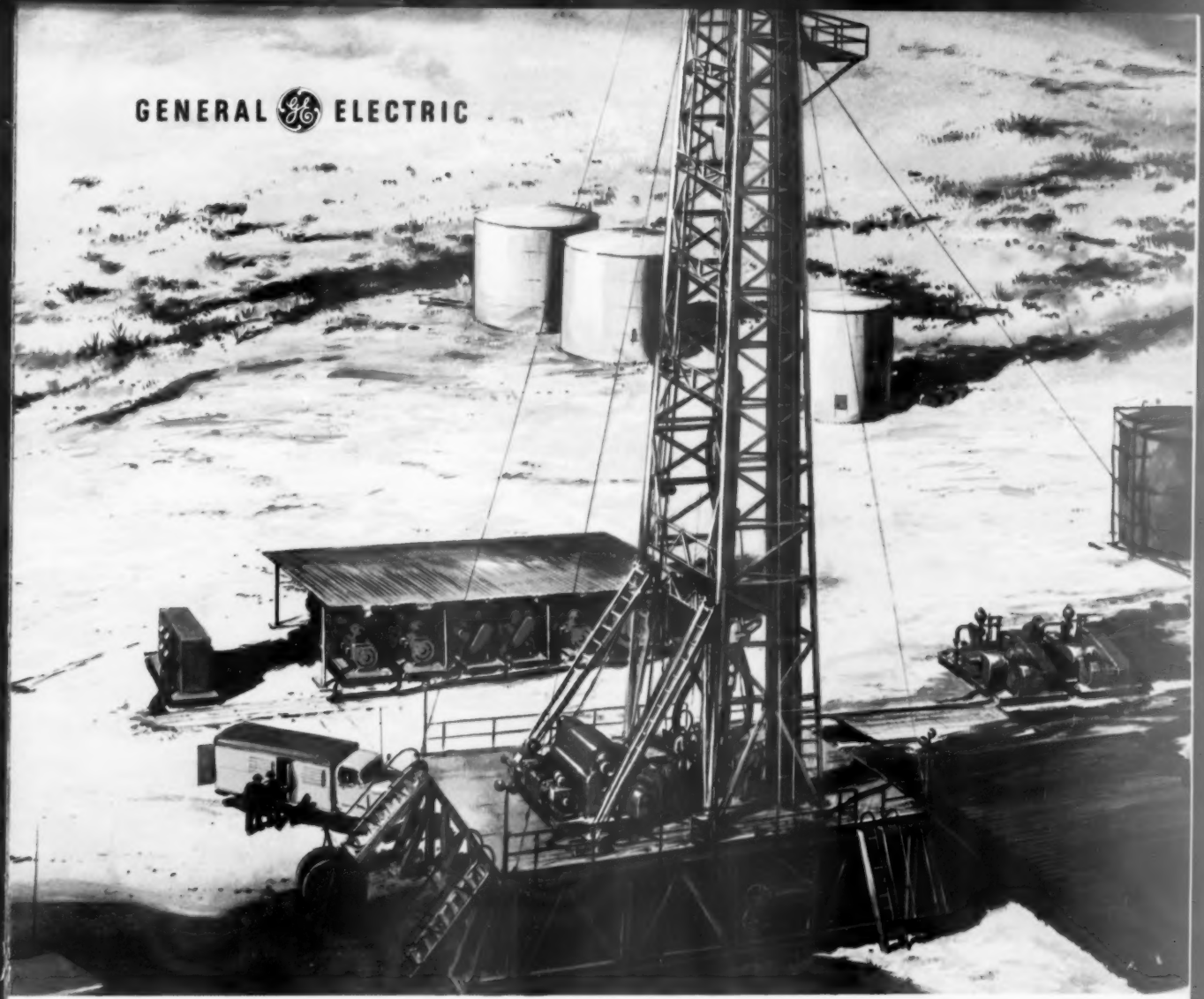
Tentative plans for construction of a $4-million pipeline and tanker terminal project to move oil from the Swanson River Unit will be put into effect by December, 1961, if production and reserves of the unit prove sufficient to justify the expenditures.

•

Larkin Packer Co., which makes and sells a wide variety of oil field specialty items, has merged with Koehring Co.

The transaction, whereby Larkin becomes a Koehring division, was for an undisclosed cash payment.

Presidents of the two companies, in a joint statement, said "No changes are anticipated in Larkin policies, so that Larkin customers can expect to



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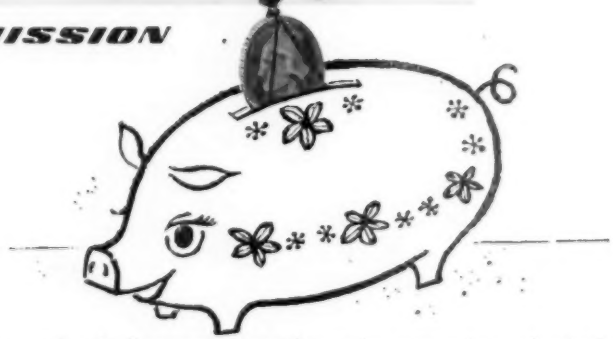

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•

Bids totaling $311,820 were made at a recent sale of oil and gas leases on 11,684 acres of land on the Wind River Indian reservation, Wyoming.

Carter Oil Co. made the top bid, offering $151.17 per acre for an 80-acre tract in section 35-1s-1e, Fremont County.

•

Drilling Highlights

Colorado—Skelly Oil Co. No. 1 Bailey, section 3-26s-45w, Prowers County, yielded 72 b/d of oil plus 34 b/d of water on the swab through perforations in the Morrow at 5,027-36 ft. The well is the first oil producer in the county and is 2 mi. north of the county's first gas producer, completed last year as a workover.

West Texas—Cities Service Oil Co. No. 1—E Brown, section 21, block A-41, psl survey, Andrews County, recovered 5,500 ft. of high-gravity oil on 3-hour drillstem test of the Ellenburger at 11,670-737 ft. The discovery is 3 mi. east of Martin field.

Also in Andrews County, Texaco Inc. No. 20—H Parker, section 15, block A-46, psl survey, completed recently as an Ellenburger discovery, has been dually completed as a Strawn discovery flowing at the rate of 457 b/d of 39.4-gravity oil through 22/64-in. choke and perforations at 9,351-589 ft. The earlier completion in the Ellenburger was for 441 b/d of 45-gravity oil through ½-in. choke and perforations at 12,349-59 ft. Closest Ellenburger production is 3½ mi. west, in Deep Rock field.

Oklahoma—Sinclair Oil & Gas Co. No. 1 Overton Unit, section 13-3n-23e, Beaver County, flowed 260 b/d of 44-gravity oil in 16 hours through ½-in. choke and perforations in the Oswego at 6,318-55 ft. The discovery is 2 mi. south of production and 15 mi. southeast of nearest Oswego production in Floris pool.

Lake Erie—New York State Natural Gas Corp. et al No. 1 Block 2, second offshore test drilled on the American side of Lake Erie, is being plugged after reaching total depth of 4,740 ft. When plugging operations are completed, the company's mobile rig will be towed to shore for lay-up over the winter season.

Southwest Texas—Texo Oil Corp. et al (Ardmore, Okla.) No. 1 Peters Gas Unit, Duval County, flowed 205-million cf/d of gas on initial open flow through perforations in the Yegua at 3,260-300 ft. The prolific well is a ½ mi. extension for Peters Unit, which produces gas from the Yegua.

Alberta—Lobitos Oil Fields Canada, Ltd., No. 10-22 Bigoray, lsd 10-22-51-8w5, 9 mi. north of Cardium oil production in Pembina field, flowed at the rate of 2,000 b/d on drillstem test of a 15-ft. interval in the Basal Blairmore above 6,150 ft.

Northeast Louisiana—Arkansas Louisiana Gas Co. No. 1 S. Drew Kennedy, section 2-16n-3e, Ouachita Parish, was dually completed for 7.8-million cf/d of gas on open flow through perforations at 6,477-829 ft. in an upper Hosston, and 6.6-million cf/d on open flow through perforations at 8,494-502 ft. in the lower Hosston. The discovery is 6½ mi. southwest of Bridge Brake field.

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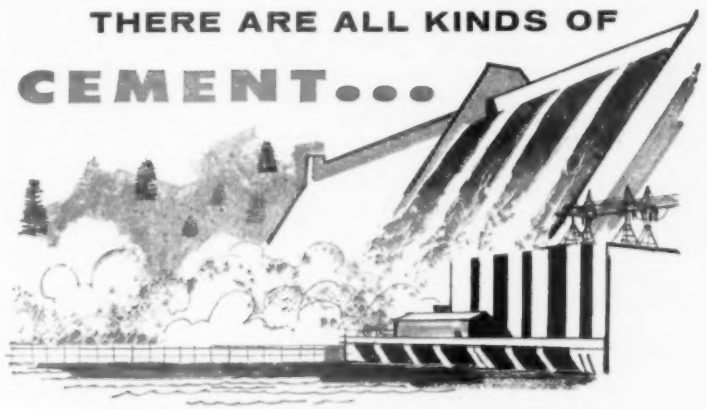

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Special Report **DRILLING**

In Drilling: Time for a Change

It's becoming increasingly clear that if there is to be a major technological breakthrough in drilling, it must involve an entirely new concept of making hole. One point is sure: There's not much—if any—more that can be done to improve present tools in a big way.

Cost was a major problem to Col. Edwin L. Drake in drilling the oil industry's first wildcat in 1859. There have been a lot of changes in the drilling industry since then, but that one fact remains constant: High drilling costs are still a major problem.

As with tools and methods, the differences in costs between 1859 and today are mostly a matter of degree, not of kind. Where Drake paid $4.00 for each drill bit, today's contractor may pay from $100 to $1,600, or more. And where the total cost of Drake's well has been estimated at around $5,000, today's average-depth hole (4,071 ft.) costs around $56,000 to drill and complete. And holes drilled to 15,000 ft. or deeper average about $775,000 each. In the world's deepest hole—Phillips Petroleum Co. No. 1-EE University, Pecos County, Tex., drilled to 25,340 ft.—the mud cost alone was $266,000.

Despite the hobbling effect of ever-rising costs, however, the drilling industry has come a long and progressive way in its first 100 years.

Though Col. Drake had "a rig over the hole" and used cable-tools, his equipment compares with today's modern rigs as does the ox-cart with the automobile.

There are some rigs today that can be used for drilling holes to 30,000 ft., and possibly deeper. New muds and cements have been developed to offset problems that Col. Drake never even knew existed. Available horsepower to drive the various components on today's rig has soared hundreds of times beyond the 6-hp. steam boiler used by Col. Drake. Steel and aluminum have replaced wood in derricks. And while the trend in these first 100 years has been to bigger, more complex rigs, there has been a related trend to portability and flexibility. Additionally, drilling has become ever safer over the years.

These are but a few of the myriad changes that have taken place in drilling since Col. Drake pounded his way to history at Titusville.

The contractor has been able to keep costs within line and continue in business by steady improvement in tools and techniques. But a growing portion of the industry is convinced that a ceiling has been reached—that little more can be done to increase efficiency with present equipment.

Says a Mid-Continent contractor: "Research is badly needed to cut drilling-time costs. The industry has just about reached its maximum rate of penetration with existing equipment and technical knowledge. What we need is something revolutionary."

An engineer for a southwestern major adds: "Present equipment is, inherently, very inefficient—I mean the idea of having your bit do the work at the end of a two-mile long flexible shaft. We will have to have a drastic change in equipment to increase drilling efficiency."

But a deterrent to greater change in drilling methods is reflected in the old saying: "Be neither the first nor the last to try something new." One major company engineer points out, however, that the general economic squeeze has made it necessary to get more done for less money, "so everybody's been more willing to take chances than they would otherwise."

Considerable research and field-testing is in progress on several new concepts of drilling. It's entirely possible that one of these may be the standard mode of drilling during the next generation.

The turbodrill, already a familiar development, has proved capable of speeding up the rate of penetration. But this has been offset by the resultant short bit life. This fact was underscored a few weeks ago when Dresser Industries' Turbodrill Division was moved to the Security Engineering Division in order to step up bit development (PW—Aug.28'59,p20).

Pan American Petroleum Corp.'s new rotary-percussion tool has reportedly set new penetration and bit-life records at widely separated drilling locations in the U.S. and Canada. (A report on these developments was given this week at the Society of Petroleum Engineers, AIME, meeting at Dallas.)

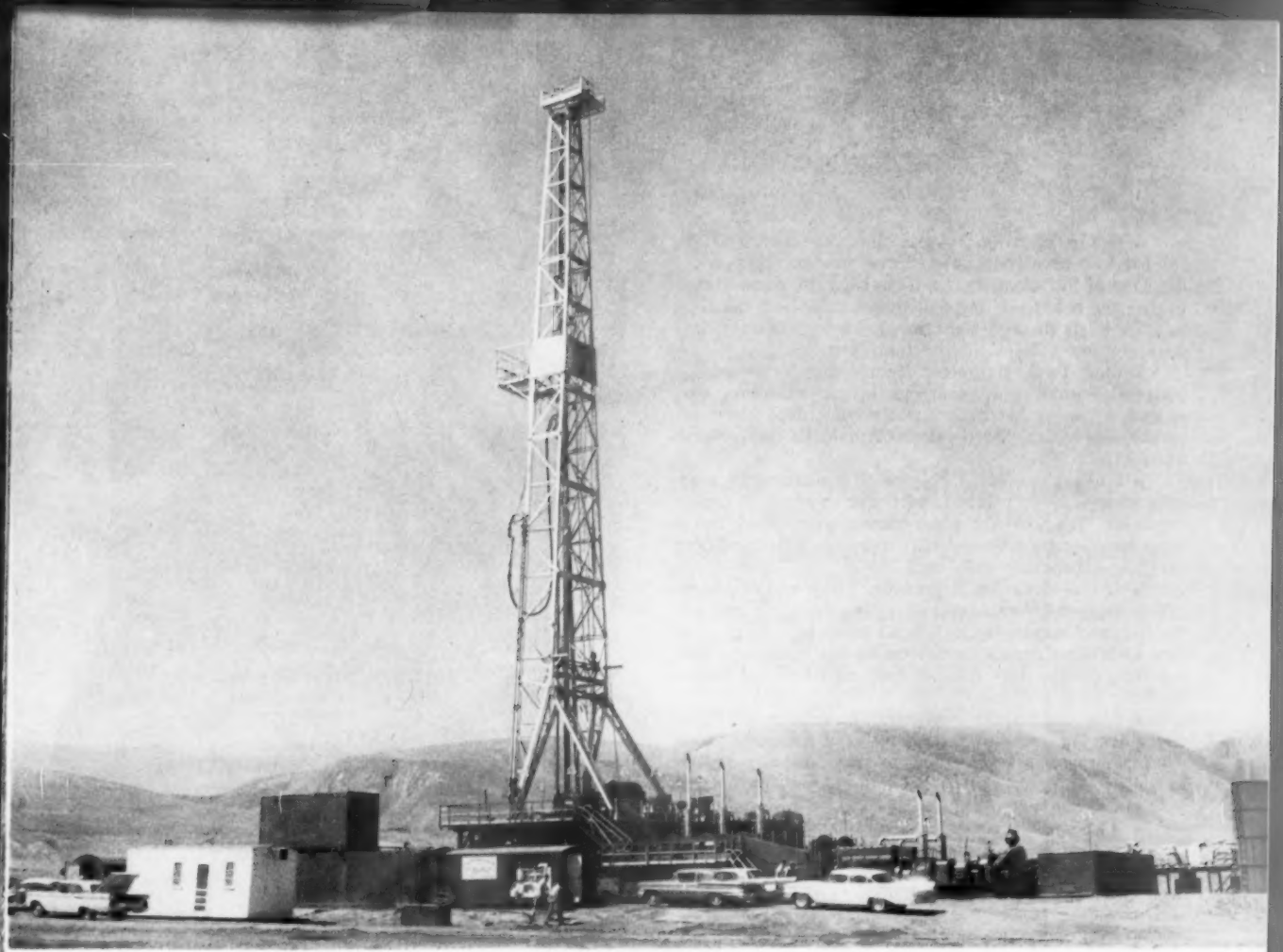
Testing of the sonic drill is being continued by several companies. One such tool, in which sound waves are converted into mechanical vibrations of the drill bit, didn't hold up too well in a recent West Texas field test. The problem: metal fatigue. This tool, however, is still in its earliest stages, so problems are to be expected.

Electrodrills, on wireline or drill string, are being studied. Such drills are being used increasingly in the Soviet Union (PW—Jun.5'59,p23).

The really big breakthrough isn't in sight yet. There are, however, many pie-in-the-sky ideas kicking around—any of which might become a reality in the next century.

The hopes of many drilling contractors are wrapped up in this comment by a Texas engineer: "Some day somebody is going to come up with something that's a radical departure from what we normally visualize as boring a hole in the ground . . . I'd like to have something that I could hang on the end of a wireline and just start in the hole and keep going. Or a hose—a small hose—even if we had to circulate a weight-containing drilling fluid. What it is going to be yet I don't know, but I've got a good idea. We're poking around and running down a few facts."

John E. Brantly, past president of the American Assn. of Oilwell Drilling Contractors, spelled out some future possibilities for the centennial issue of the "API Quarterly." Brantly theorized that holes might be drilled without the familiar derricks or masts in the oil field of tomorrow. It may be possible, he said, to raise and lower



NATIONAL 130 rig is being used by R. B. Montgomery Drilling, Inc., in Wheeler Ridge field, California. This big rig, new to California, will soon be equipped with National's new H-1250 pump, replacing one of two 600-hp. pumps.

pipe by means of hydraulic lifts, and with automatic handling equipment. In some cases, in fact, drilling may not be used at all, Brantly continued; holes may be made by atomic, liquid, or dry-charge explosives, or they may be burned into the earth by flame or electric heat with equipment and methods equally advanced.

A. L. Solliday, Pan Am president, also has taken a stab at trying to forecast the drilling process of the future. "On the basis of current research," he says, "it is entirely reasonable to presume that the future drilling unit will be a self-contained, helicopter-like machine that will fly to a well site and 'bore' the well, using controlled blasts of jet flames from the new liquid rocket fuels, or perhaps ultra-high-frequency sonic waves, to burn a hole through the earth's crust."

It's almost a certainty, too, that whatever new method may be devised for getting at the oil reservoir, nearly all of the operations will be automatic. Computers will take the guesswork out of routine jobs, and make quick allowances for the unexpected, intangible problems that can arise in drilling.

Whatever course drilling may take, competition will remain keen, and costs a continuing problem. The number of holes drilled will rise, to a range of 55,000-60,000 in 1965; to 65,000-68,000 in 1970; and to 70,000-80,000 in 1975. This growth will undoubtedly spur research efforts. It also means that there will be a premium on cost-cutting methods.

Gains Are Being Made

Though the big breakthrough continues to elude the drilling industry, scattered improvements in tools and techniques are being made, each contributing in some way to the ultimate goal—top efficiency at low cost.

Taken collectively, these developments make an impressive record, and underscore the industry's concerted effort to bring costs down. Here are some highlights:

- Big Chief Drilling Co. is working on a program of "target drilling" in a crooked-hole area. A surface location is selected at an angle from where the company wishes to drill and the hole is allowed to drift.
- A southwestern major has found that "lost motion" in drilling is becoming more significant. "As we increase efficiency, a piece of equipment will perform faster," says a spokesman. "Since it is performing faster, its lost time is more significant than it was in the past."
- There is a continuing growth in the use of drilling engineers to analyze drilling programs on a well-by-well basis and to recommend the best drilling practices.
- There is a growing use of radio by contractors. Those using it report they are "amazed" and "pleased" with the results. A great deal more can be done with less personnel, and the savings in rolling stock can be substantial, says one contractor.

continued ▶

• A sort of nylon "sleeve" has been developed to combat lost circulation. The sleeve, or case, goes across the zone of lost circulation and contains the cement used to plug the hole while the cement sets. The hole can then be drilled out through the cement, leaving a sheath, and work continued below in the formation.

• One Texas contractor reports that he is increasingly using small completion rigs, instead of drilling rigs, as soon as casing has been run and cemented. These are particularly valuable in the case of multiple completions, he reports.

• Coating air-drilled holes with a plastic either has been done, or is planned, says one research company engineer: "It's just like plasti-coating pipe. They run a spray head in the hole and start spraying. This conditions the hole—keeps the walls up."

• Use of desanders is growing. These replace chemical cleaning of the mud, save on valves, liners, pumps, and the like, and remove up to 1 lb. of solids per gal. of mud. One Oklahoma contractor reports he cut three days drilling time on the first 8,500-ft hole on which he used a desander in a test run.

• New and heavier mud pumps have been developed, and others are in the works. Nearly all of the major pump manufacturers have been trying to satisfy the demand for progressively bigger pumps—in horsepower but not in bulk and weight.

• The world's largest drill-collar stabilizer (picture, page 44) has been developed for use in the drilling of large-diameter holes. It also affords the advantage of minimum hole deviation while maintaining high bit weight and maximum penetrating rate.

• And one major reports: "One of the industry failings has been a tendency to ignore economics in detail in drilling. We are now looking more closely at the detailed costs that make up a specific operation, not just the total cost. All the people involved are beginning to realize now the significance not only of every day or week, but of every minute of every day."

Muds Are More Specialized

The mud industry is seeking solutions to specific problems concerning muds, rather than looking for some "cure-all" additive.

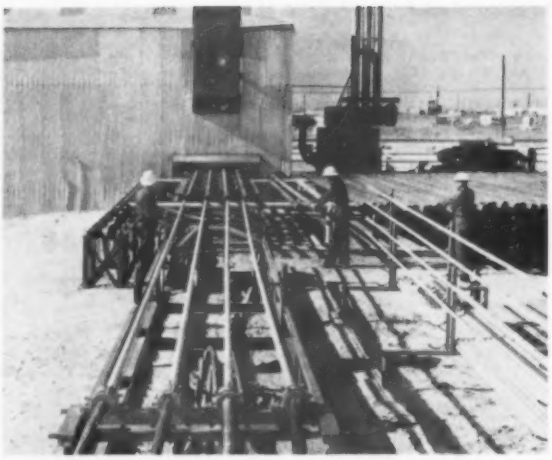
Answers are being sought to such problems as temperature effects, lost circulation, hydration and swelling clays and shales due to water in the mud, corrosion, and many others.

There is considerable research under way by mud companies aimed at the day when the industry will be drilling to 30,000 ft. and deeper. The Baroid Division of National Lead Co., for instance, has developed some additives that it hasn't yet been able to break down under severe laboratory conditions.

Drilling contractors and operators, meanwhile, are setting their own trends in mud practices.

The use of oil-base and inverted-emulsion muds is becoming more widespread.

A spokesman for a leading mud company says there are several advantages to using such mud. For one, he says, the filtrate (the liquid phase that goes into the formation) is all oil. In some clays and shales, therefore, in which a water filtrate would cause hydration, with consequent swelling and possible reduced productivity, the oil-base or inverted-emulsion mud is "highly desirable."



SHOT-PEENING—hammering pipe with steel pellets—is carried out by Metal Life, Inc., at this Odessa (Tex.) plant.

Such muds also have a lubricating quality. For example, since the cake on the hole walls is oil-impregnated, friction against the drill pipe is reduced. This, in turn, increases the amount of weight and torque that is applied to the bit—instead of being lost uphole—and helps to increase the penetration rate.

Glenn A. Trimble and M. D. Nelson, Jr., of Magnolia Petroleum Co., told this week's meeting of AIME's Society of Petroleum Engineers that Magnolia has used inverted emulsion muds in central Oklahoma for the past six years "with outstanding success." They said the principal advantages of this mud system include: (1) less damage to formation productivity; (2) more positive and quicker formation evaluation; (3) quick and easy well completions; and (4) effectiveness as a workover mud.

Maintaining the solids in suspension in oil-base muds had been a problem for some time. The solids had a tendency to separate out during drilling. That, of course, would change the characteristics of the mud system. The problem was partly corrected by grinding the solids (barites, etc.) into very fine particles, or by increasing the viscosity of the mud. But neither solution was too satisfactory.

Baroid is now marketing a product, "Baratone," that is said to prevent settling out of the solids in oil-base or inverted-emulsion muds. This would enable the contractor to weight up such muds without increasing viscosity. In general, Baroid says, Baratone behaves in oil the same way that bentonite behaves in water, but it doesn't increase the viscosity or the gel.

Magnet Cove Barium Corp., one of the Dresser Industries, will soon begin field-testing a new type of inverted-emulsion mud which it hopes will be more stable than existing types.

Milwhite Mud Sales Co. has come up with "Super-Col," a suspension agent that has been tested at temperatures of 350F for as long as seven days with little or no change in viscosity. This product has many characteristics of

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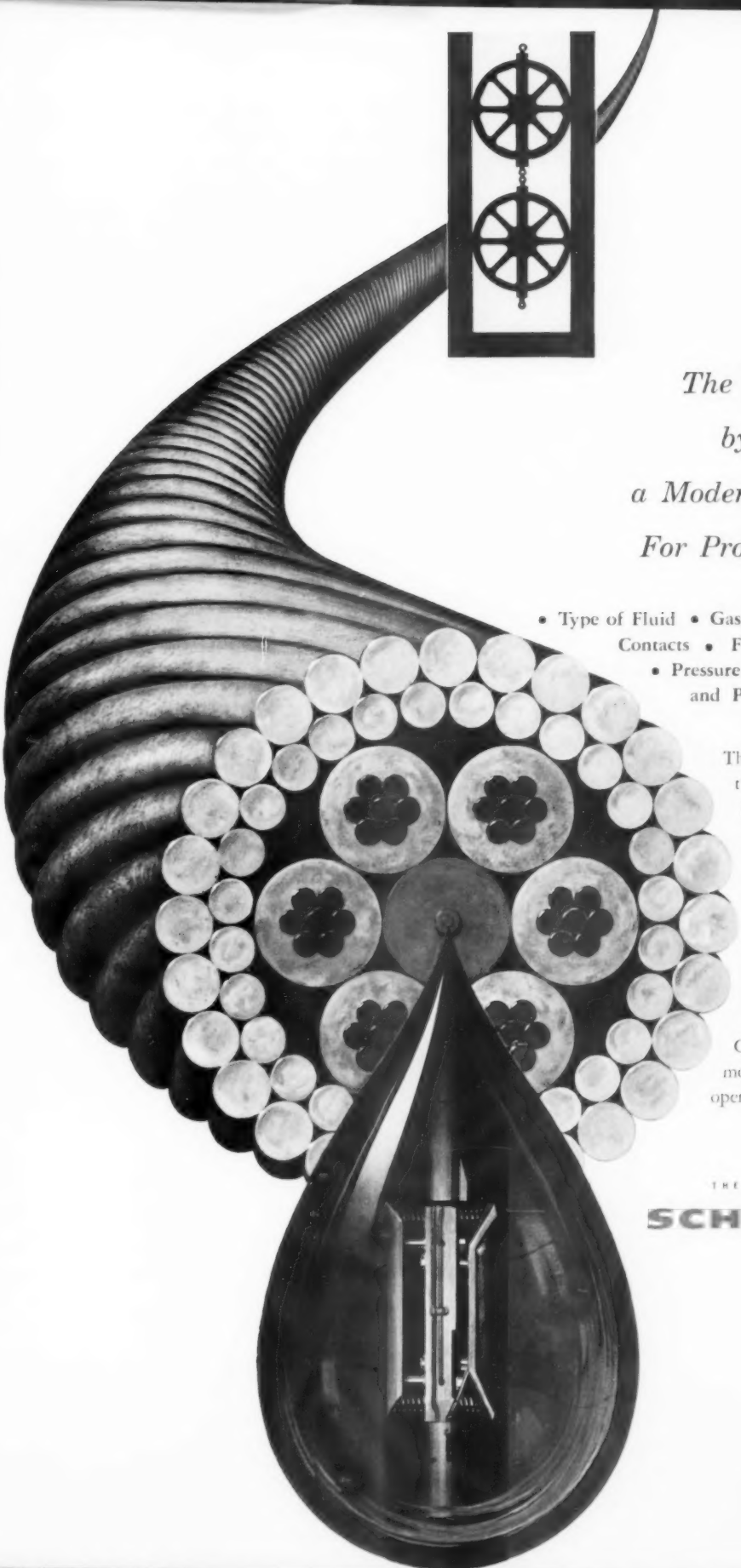

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One major company has developed something entirely new in the way of an oil-base mud product.

Field evaluation tests are continuing. Generally, however, the product is capable of being delivered to the rig in paper bags. The material can be added to any crude or diesel oil to form an oil-base mud.

The weight of the material going into the mud is on the order of 8 lb. to 12 lb. per bbl., rather than the usual 30 lb. per bbl. and up of mud-system materials. This low-weight factor is expected to increase the drilling rate. Cost, it is believed, will be relatively low.

There is a definite trend toward an increasing use of gypsum-base muds.

It had been the general practice to use lime-base muds to counter such downhole conditions as large salt-water intrusions, and to condition the hole better. But lime-base muds had only limited inhibiting action, whereas gyp-base (calcium sulfate) muds offered more inhibition because of a higher filtrate calcium level.

Gyp-base muds are tolerant toward such contaminants as anhydrites, salt, cement, and the like. And they have high temperature-resistance. One major company engineer, speaking of gyp muds, says:

"It's an inexpensive fluid, it's controllable, and it gives you a good hole. It does a heck of a lot of things. And it's damned difficult to contaminate. We use a lot of it offshore."

Development of proper thinners to offset the high, flat gel property of gyp-base muds has been a major factor in making such mud systems practical.

Sufficient reports on field use have now been compiled to show that extreme-pressure lubricants for drilling fluids are increasing bit life and penetration.

One recent study showed that the EP additive—first introduced by Gulf Oil Corp. (PW—Feb.21'59,p22)—reduces wear on parts exposed to the mud system, prevents drill-pipe from sticking on the wall, and reduces downhole torque, when used in a water-base mud.

There is every evidence (as a new study soon to be released will show) that EP additives (Gulf's and others) have caught on hard, and will see much wider use in the months ahead. (Milwhite's EP additive, which combines an anticorrosive agent with a lubricant, will soon be made available in packaged, dry form.)

There also is an apparent trend to more use of reconditioned mud, especially in southern Louisiana.

Here's how it works: The supplier gives credit to the drilling contractor or operator for "leftover" mud after a well is completed. Since this leftover mud usually contains valuable ingredients, it is taken to a central plant for reconditioning—by centrifuging, diluting, and the like. It is then put in storage. When mud is again needed, it is conditioned to the properties desired and sold at a price that covers costs of reconditioning, storage, and hauling, plus some margin of profit. The reconditioned mud is transported by barge, where location permits, or by truck.

Another mud trend: Brine instead of water is now used as a drilling fluid in an estimated 70% of all Permian Basin holes. First experimental use of brine in this area began only about four years ago. Its growth is due to the fact that the brine prevents leaching and dissolving of the salt strata; less swelling and sloughing of the redbeds, bentonites, and shale; safer downhole conditions; straighter gauge hole and less drilling time; and less blocking and hydration of shale in production zones.

LARGEST STABILIZER ever built weighs more than 1½ tons, is 9 ft. long. The 23½-in. wing type drill collar stabilizer has a 10-in. body. It was built by Houston Oil Field Material Co. for use by Shell Co. Qatar, Ltd., in Qatar.

A new development in drilling fluids that will be watched closely in some areas is the use of powdered seaweed as a water-loss control agent.

The substance is proving useful in those sections of the country (notably West Texas and parts of Oklahoma) where high salt concentrations in shallow formations require the use of salt-base muds.

A recent example of the use of seaweed is a hole drilled by Oilgas Management Corp. in Hartley County, Texas Panhandle. The hole was carried to 5,400 ft. and abandoned. Says Tom Abels, of Oilgas: "A satisfactory mud program was obtained through use of the seaweed additive. But due to the unproved area in which we were drilling, it is difficult to say that it was any better than another water-loss control agent would have been."

Douglas Dobbs, of Rotary Mud Co., of Oklahoma City, Okla., who recommended use of the seaweed on this test, says: "The advantage of this stuff is that it is possible to drill through the Permian salt sections without setting intermediate (salt) string. The seaweed additive, unlike other water-loss control agents, is not affected by the salinity of the mud stream."

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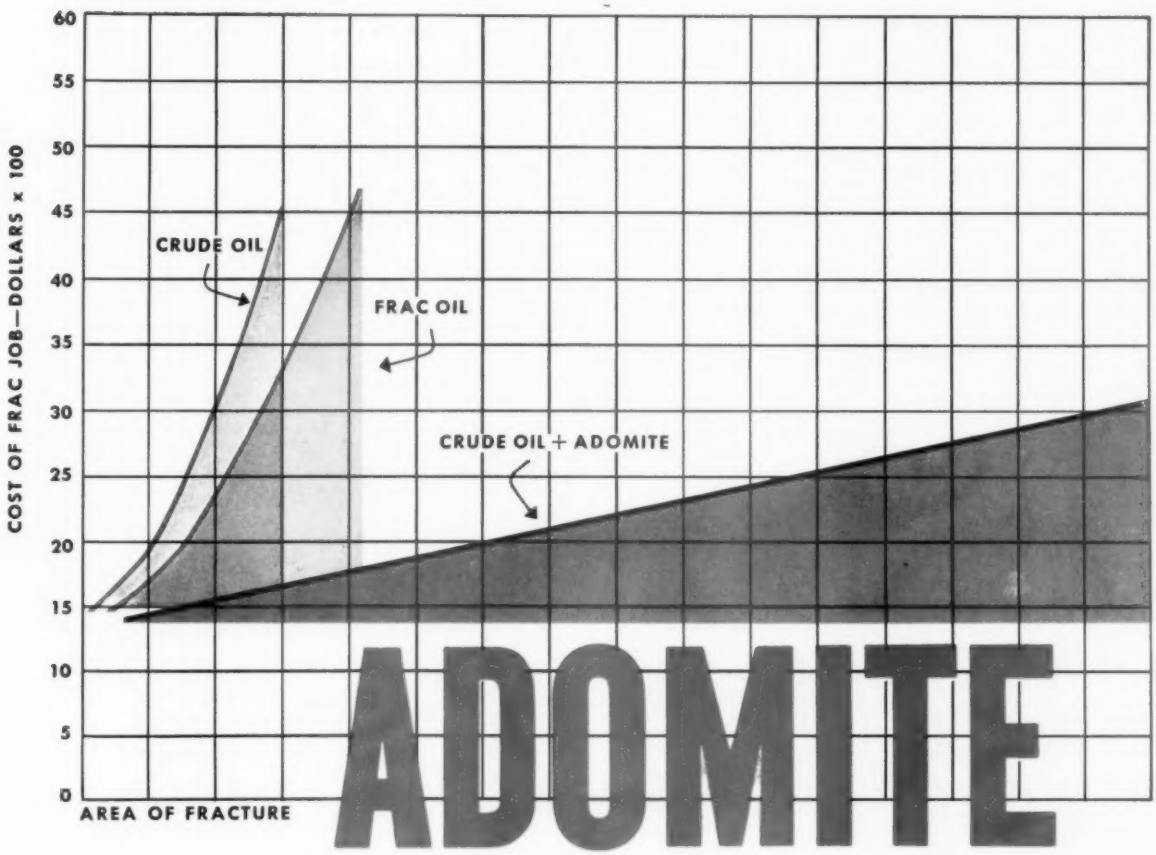

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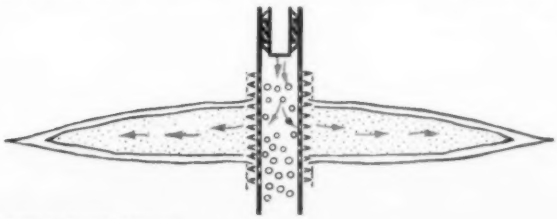

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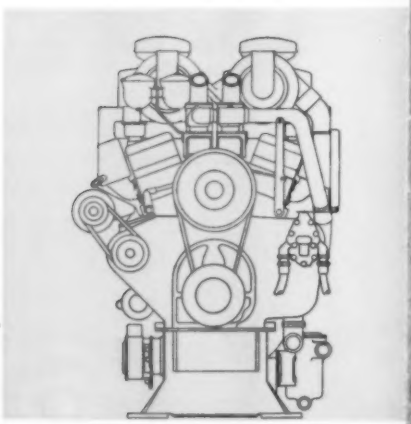

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Deep-Hole Cements Improved

A continuing rise in the number of oil and gas wells drilled to depths of 15,000 ft. or more has triggered intensified research to improve cements. The aim is to develop products that will hold up under high temperatures and pressures.

Laboratory experiments have shown that the temperature range for strength loss in cements begins at about 230F, but a more severe retrogression is encountered above 260F, generally below 12,000 ft.

Recent research on deep-well cements has attempted, primarily, to improve two basic properties of the slurry: (1) Adequate strength development in as short a time as possible and the retention of this strengh at high temperatures and pressures; and (2) sufficient thickening time to allow placement of the cement in its proper location.

Continuing research by Halliburton Oil Well Cementing Co. in its research laboratories at Duncan, Okla., and at various field locations has pointed to several formulations that attain the first of these objectives with varying degrees of success.

One of the most promising products of this research has been a composition of a pozzolanic material, hydrated lime, and set-control additives.

When it's combined with hydrated lime, the use of pozzolan is limited to temperatures above 140F. But this composition was the only oil well cementing material studied by Halliburton that actually showed consistent evidence of gaining strength with time at temperatures above 250F.

A cement blend having superior qualities for deep, high temperature work also has been created by the addition of moderate amounts of finely divided silicon dioxide to Portland or retarded-type cements.

The two leading sources of silicon dioxide are silica flour (powdered silica) and diatomaceous earth.

Several major oil companies are doing experimental work on the use of silica flour for deep-well cementing. Mixtures containing 15% to 40% silica have been commonly used.

Satisfactory performance also has been obtained in limited field application, including one deep test in northwest Oklahoma, which had a reservoir temperature of about 375F.

Many operators believe they have cut costs considerably by reducing waiting-on-cement time. Now, however, they feel they have gone about as far as they can unless governmental agencies ease up on requirements.

Atlantic Refining Co. saved $180,000 on 280 holes drilled in a year's time by reducing WOC time. The company cut almost 2¼ days per well, on the average.

A Louisiana independent reports, "On cementing time we have reduced waiting periods on long strings from 72 hours to 48 hours. On surface pipe, we have cut WOC from 48 to 24 hours. Offshore, we saved $200 per hour by cutting cementing time."

A southwestern major says: "We've cut WOC time down to an absolute minimum every place where the regulatory requirements are not too stringent. Now it's just a matter of getting the governmental agencies to wake up and understand the costs involved."

Another major: "There should be standards for cement for achieving proper strength, instead of an arbitrary time set without consideration of well conditions, and so on. State requirements for WOC should be more flexible. It's the operator who can best determine the proper time for cement setting, based on conditions."

Very Deep Drilling Slows

Most everyone decries the very high cost of drilling very deep wells and the tremendous odds against finding real production at those depths. Yet these and other negative factors apparently aren't enough to snuff the dogged determination to go deeper that marks many segments of the drilling industry today.

Interest in ultra-deep drilling had reached a new peak just about this time a year ago, when work was being completed on several such tests, including the world's deepest hole—Phillips Petroleum Co. No. 1 EE University, Pecos County, West Texas, which was carried to 25,340 ft. (PW—Oct.3'58,p35).

When one after another of these very deep tests turned up dry, the budget-shattering expenditures forced the industry to make an agonizing reappraisal of such projects. But while this reappraisal undoubtedly had a sobering effect, it didn't ring down the curtain on all very deep tests.

In Oklahoma, for instance, Continental Oil Co. has programmed a 20,000-ft. test in Washita County, in the Anadarko Basin. Carter Oil Co. and Magnolia Petroleum Co. also are active in this area on deep tests.

In the Texas Panhandle, Parker Drilling Co. is using a new gas-electric rig to drill Gulf Oil Corp. No. 1 Bowers, a projected 20,000-ft. test in Hemphill County (PW—Sep.11'59,p22). And Magnolia is approaching target depth of 20,500 ft. at its No. 1 Kathleen J. Moore in Pecos County, where some of the world's deepest holes have been drilled.

Present market condition, however, have virtually precluded deep wells except for the few big operators who are able and willing to take the risks in the hope of finding really big reserves.

Dale Mount, Dallas independent, doesn't look for much deep drilling until shallow oil runs out. He says that the tendency in the past two years has been to drill shallower wells. (AAODC figures show average well depth dropped from 4,103 ft. per well in 1957 to 4,031 ft. in 1958.)

Many operators believe that deep drilling pays off if a good gas well is brought in, since gas production is not so restricted, if at all, as is oil production. The rate of return, therefore, can be better. As Lee Daniel, of White Eagle Oil Co., puts it: "Drilling below 16,000 ft. just can't be done for $3 oil under existing proration statutes."

Here's what one Louisiana contractor says: "An 8,000-ft. well in shallow water will cost about $300,000; one that goes to 12,000 ft. will cost from $500,000 to $750,000, in a comparable location." Below 12,000 ft. the costs go disproportionately higher. One Gulf operator adds, "We are drilling to 18,000 ft., and the only comment on drilling costs we can make is: They are damn high."

Still another contractor reports, "We just recently drilled below the 15,000-ft. level. Our experience has been that when you go extra deep, everything you need to do is just ten times harder—everything."

continued ▸

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FRANKS COMET '50,' is being used by Carter Oil Co. to carry out its big slim-hole program in the Wewoka area of Oklahoma.

COMPARISON shows how much more equipment is needed (left) for conventional wells than for slim holes at Wewoka.

Slim-Holing: On the Upswing

Slim-hole drilling—with its potential savings for most contractors—seems to be winning greater acceptance, largely because of a better understanding of its advantages and limitations.

Philip L. McLaughlin, president of McLaughlin Co., Dallas, a slim-hole proponent who built a strong backlog of experience in the method in a former job with Cardwell Mfg. Co., says operators and contractors "now know where to use the technique."

He adds that the current change of attitude "probably stems from an economic necessity to reduce industry exploratory and development costs."

McLaughlin stresses that slim-hole drilling is an evolutionary, not revolutionary, development. Still, he adds, it is opening the petroleum industry's eyes to the need for fully utilizing currently available equipment for maximum economy. Principal economics of slim-hole drilling, he says, primarily lie in the reduced expenditure for casing.

There has been considerable slim-hole activity in California in recent months.

Shell Oil Co. reduced casing size in a shallow development drilling program in East Coalinga field and cut well cost about 7%. The company reduced the size of the holes from 9⅞ to 7⅞ in., casing from 7 in. to 5½ in., and liner from 5½ in. to 4½ in.

Standard Oil Co. of California completed its first slim-hole well in California last winter in Buena Vista field. The hole was drilled to 4,055 ft., and 2⅞-in. tubing was cemented on bottom to serve as casing, with 1¼-in. macaroni string hung at 3,757 ft. to serve as tubing and rods. The company normally would have used 7-in. casing with 5½-in. perforated liner, 2-in. tubing, and ¾-in. rods. Initial production of 80 b/d of 26-gravity oil indicated that the well was on a par with other producers in the same pool.

But use of small strings resulted in saving in pipe cost alone of about $10,000.

Also in California, Humble used the slim-hole method last April to complete a well in Rosedale field for 130 b/d through 3/16-in. choke. Humble cemented 7-in. casing at 521 ft. to serve as surface pipe and 4½-in. casing at 4,927 ft. for the oil string, completing with 2-in. tubing. The company's first well in the area was completed with 9⅝-in. surface casing and 5½-in. oil string, while the second used 10¾-in. surface string and 7-in. oil string. Since then, Humble has completed five more wells in the pool, in each case using 7-in. casing as the surface string, 4½-in. casing as the oil string, and 2-in. tubing.

And Texaco Inc. completed a well in Bowerbank gas field with 7-in. casing set at 511 ft. and 2⅞-in. tubing (as casing) at 4,900 ft. for 1,170,000 cf/d of gas through 11/64-in. choke. The hole was drilled and completed for about $25,000, an interesting figure for California work.

Slim-hole drilling with a trailer-mounted rig has helped Carter Oil Co. net a profit from an otherwise marginal pay in the old Wewoka field of central Oklahoma's Seminole district.

Flush production from the older Ordovician pay was long since exhausted when a re-examination in 1957 indicated a small but promising reservoir in the Booch (Pennsylvanian) sand at about 3,300 ft.

Through close cost-control measures and use of the latest techniques in perforating and fracturing, plus a conservative casing program, Carter was able to complete 18 conventional wells in the Booch for approximately $25,350 each—some $4,500 below normal cost for wells of that depth in that area. Initial production averaged more than 200 b/d per well.

But seeking still further reduction in completion costs, Carter began using a 2⅞-in. casing for a production string

continued ▶

in December, 1958. Nine such wells have been completed so far, with per-well costs as low as $19,100.

Conventional wells in Wewoka field have been drilled with 9-in. to 7⅞-in. bits, and cased with 5½-in. or 4½-in. production string. Carter's first four 2⅞-in.-cased wells were drilled with 7⅞-in. bits. One well was turbodrilled with 8¾-in. bits and four subsequent wells were drilled with 6¾-in. bits.

An average penetration rate of about 25 ft. per rotating hour has been maintained in drilling the slim holes, an increase of 17% over conventionally drilled holes in the area. An average of fifteen 6¾-in. bits have been required, however, to drill the slim hole to 3,300 ft., roughly one bit more per hole than required for conventionally drilled holes. The difference in bit life has been attributed to weaker bearings in the smaller bit sizes.

Well servicing has been the only real problem encountered, as swabs stuck in the 2⅞-in. casing cannot be recovered by pulling tubing as with conventional completions. Acid-soluble swab mandrels with shear pins now are being used for all swabbing operations. The pin is designed to shear when a 10,000-lb. pull is placed on the swab line, after which caustic or acid is run down the casing to dissolve the mandrel and allow it to fall to bottom.

A southwestern major, who favors the slim-hole method, points out, however, that a detailed analysis should be made to determine the optimum size of the hole to be drilled and casing to be used.

Says a spokesman for this company: "There is an optimum-size hole for the equipment available to drill it and for the equipment available to work it. There also is an optimum-size hole for the intended use. We need to figure on how much volume we're going to handle and plan our hole size accordingly."

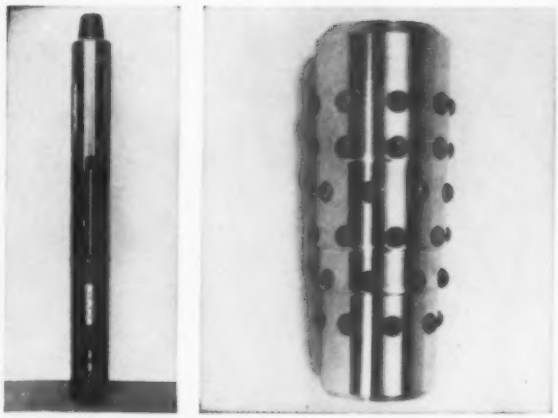
He gives this example: "A company figured it would eventually be waterflooding a Panhandle field and be handling some 600 b/d of fluid from a well (oil and water). So it dug a big hole, set 5½-in. casing, and installed big pumps during the development stage.

"Instead of spending about $10,000 per well and putting a $10,000 pumping jack on it, this company spent $40,000 per well and put a $20,000 pumping jack on it and used it 12 years.

"It would probably have been better to drill a small well to get the primary production and then drill another hole as the best way to get the secondary production. It definitely is not the best approach to say, 'I don't know what I'm going to do with the field down the road so I'm going to put everything in it big enough to do anything I want to later on.' I think the competitive status of the industry will demand a change in that way of thinking.

"The economists are really just beginning to impress us with the importance of the day-to-day cost of money. I think the trend is more and more toward putting off your spending until tomorrow."

The spokesman pointed out, however, that slim holes are not necessarily the most economic for a given area. He said his company had planned a shallow slim-hole drilling program in northwestern Louisiana. The company picked a local contractor, however, who knew the conditions "like the back of his hand." And his rig was set up to drill 9-in. holes, because that is the size hole most of the operators want in that area. Nevertheless, he was able to drill such shallow wells for about $2,000, much better than a slim-hole contractor strange to the area would have been able to do. "Under these conditions, the 9-in. hole is cheaper," says the spokesman. "But the fact that you have a 9-in. hole doesn't mean you have to set 7⅞-in. casing. You could still set 2-in. tubing."



ROTARY REAMER CUTTER, developed by Drilco Oil Tools, has tungsten carbide compacts for reaming hard formations.

And, he adds, it certainly would pay to have engineers make a detailed analysis of each hole wherever a sizeable investment is expected.

One fact is clear: There are some contractors and operators who aren't sold on slim-holing.

One southwestern major company spokesman says, "We try to stay away from it [slim-holing] where we can. We've used it in Canada, Oklahoma, and Kansas, and in some waterflood operations. But it is a last resort, as far as we are concerned, primarily because of the problems that arise."

This spokesman maintains that, "Anytime you get into a 'watch fob' kind of operation, where you're using small bits, small guns, and the like, unless you are in a position where you can abandon the hole and start over, economically, you are bound to get into trouble when you start to produce.

"If you want to waterflood and put in larger-volume equipment, you just can't do it.

"If you get into corrosion problems, you're in trouble. If you get casing leaks or tubular leaks, you're in trouble. If you're in crooked-hole country, you've got all kinds of problems if you have to lift artificially, because you can't keep one of these small holes straight.

"We use it where the economics are so damned poor you just need to save every nickel and realize that you have to get whatever you can out, then give up.

"But oil fields have a long life, and when you start to save that kind of money [the savings from slim-holing], in view of the modern technology of fireflooding, waterflooding, and other secondary recovery methods, plus things we don't even know about, you might find you haven't saved a thing.

"We don't like to restrict ourselves in what we can do in a hole. You just don't know what is going to happen later on.

continued ▸

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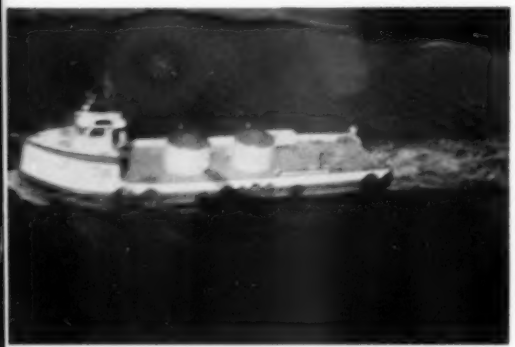
Look for the bright yellow and red Baroid store near you—wherever you drill Baroid men know YOUR needs. They are setting new records for prompt, complete delivery of mud products that help you drill faster and with more assurance of profit to you.

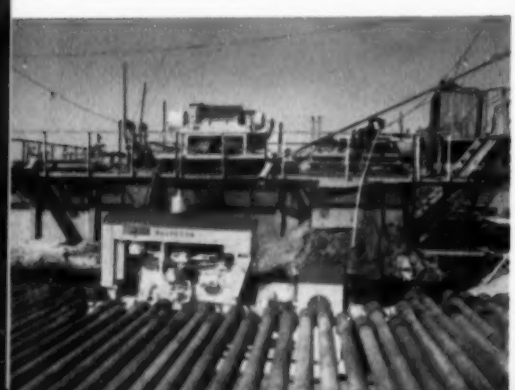
(Above) **A PINPOINT on most maps, Intracoastal City is none-the-less a large pin on Baroid's map of Louisiana stockpoints. Here Baroid facilities include loading docks for bagged mud products, Bulkans, and ample warehouse space.**



(Above) **CARRYING a 100-ton payload up to speeds of 10 knots per hour, the Baroid Express delivers bulk BAROID® to offshore rigs *f-a-s-t*.**

(Above) **VENICE is a main departure point for offshore, and here Baroid maintains a full water-stockpoint of products necessary to Louisiana offshore operations.**

(Below) **BAROID'S mud centrifuge has proved most successful in Louisiana drilling operations and effects considerable savings for operators by reclaiming valuable weight material.**



(Above) **A NEW installation in the Baroid supply and service network is the waterpoint location just off the Intracoastal Canal at Bayou Sale. Here Baroid's former off-shore delivery vessel has been converted into a huge drilling mud warehous...**

From Lake Charles to Venice

BAROID FACILITIES AND EQUIPMENT

are best . . .

For the quickest, most complete and thorough drilling mud service in south Louisiana

BAROID

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Louisiana Area Offices:
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(Above) **CAMERON is another important water stockpoint with pneumatic dock loading and unloading system, air separator system for loading Bulkans, complete bulk storage plant, and warehouse for products.**

(Below) **HOUMA is headquarters for Baroid liquid mud barges which have their own mud mixing equipment. To the left of the bagged products are the newly installed liquid mud storage and make-up tanks.**

(Left) **EMPIRE is the maintenance base for the barge-mounted pneumatic bulk plants and a terminal for Baroid barges and tugs carrying palletized bag products to the drilling industry in Louisiana and offshore.**

(Below) **LEEVILLE is home base for the Baroid Express. Also at dockside, a barge-mounted pneumatic bulk plant with a Fuller system which can deliver over 75 tons of bulk BAROID per hour.**

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Marine Terminals or Inland Stores

—they give you the most

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the mud industry.

This improved service is winning

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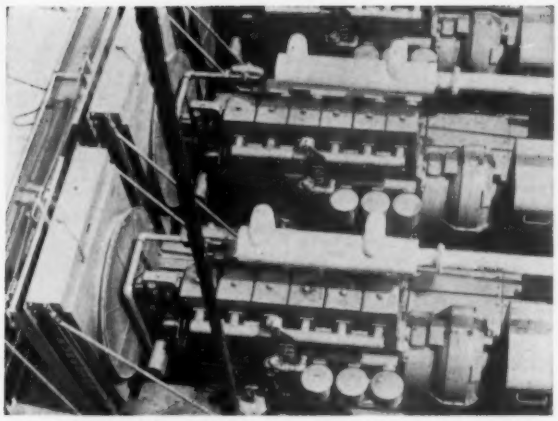
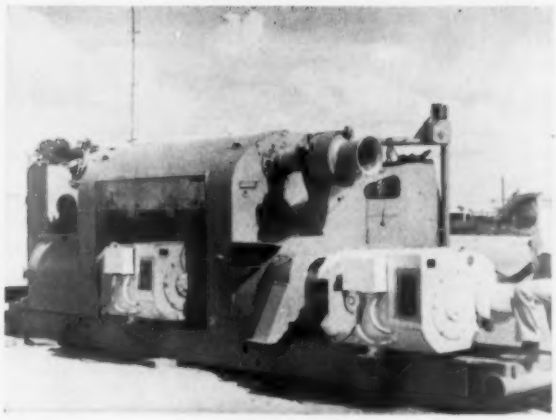
BAROID DIVISION • NATIONAL LEAD COMPANY

MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

BAROID'S New Orleans Terminal and Mill is one of the most complete mud operations in the world.



TORQUE CONVERTERS on this 1100-hp. rig are credited by Sun Drilling Co. with improving performance over six years.



MOTOR DRIVE on this new Helmerich & Payne gas-electric rig is lightweight substitute for compound and transmission.

There's More Air Drilling

Air/gas drilling is now being much more widely used in some areas. But it's still no cure-all for the ills that plague the drilling industry.

A Continental Oil Co. spokesman says: "We're still using air and gas drilling every place we can, particularly in the Rockies. It has made the difference there between drilling and not drilling in several areas. We're having very, very good success with it. It works remarkably well, and reduces our costs about 60%, over-all, when we don't run into water."

Such comments are echoed by other majors and independents. One major, for instance, reports that air/gas drilling is being done successfully even where "considerable quantities" of water are encountered. This major adds, "In some places, just 'aerated water' is being used. They're not even foaming it—just getting enough air in to aerate the water. It's being done where lost circulation is a problem."

Water shut-off remains perhaps the biggest barrier. But oldtime practitioners of air/gas drilling are finding that water intrusion isn't the bugaboo it used to be.

Where an operator knows the water zones, various shut-off methods can be used effectively. This factor, according to an engineer with a major company, is a major reason for the success of air/gas drilling in Pennsylvania. He says: "The operators there know the geology so well that they are able to set casing at the proper points and know exactly when to shift from one medium to another."

But where the water zones aren't known, as in wildcatting, it becomes a problem. A zone might be shut off and then, 5 ft. farther, another encountered. If this happens too many times, the value of air/gas drilling—its speed of penetration—is lost.

Several contractors in Oklahoma believe further growth in use of air/gas drilling is a matter of educating the users. Says one: "It's the switching over, back and forth, from mud to air or vice-versa when something goes wrong, that is creating some delay at present."

Another engineer adds: "There still is a great need for shut-off materials that will be economical and that will work under various conditions. Detergents might work where there is water encroachment, but it is highly doubtful if they'd be effective against distillate encroachment. Certain methods that might work very well in Pennsylvania hard-rock country won't work at all in some shaly areas."

In addition to these problems, certain hazards are greater with air/gas drilling than when a mud is used. One example is the hazard of fishing jobs, since a dropping pipe in a dry hole would do far greater damage than one dropping in a hole filled with fluid. Further investigation also is needed to explain the hows and whys of downhole fires and explosions during air drilling.

Electric Drives Make Headway

There continues to be a steady, though not yet spectacular, growth in the use of electric-drive rigs.

A spokesman for a major electrical equipment company says, however, that "the petroleum industry is one of the last large industries using large blocks of power that still relies primarily on archaic means."

Most of the early electric-drive rigs were concentrated in offshore work, but there has been a step-up in efforts to expand use of electric drives on land rigs.

A Dutch engineer believes that the AC torque converter holds the best prospect for minimizing increasingly complex power-transmission problems, a basic cause for early obsolescence of rigs.

W. S. Crake, an engineer for N. V. Bataafsche Petroleum Maatschappij (of the Royal Dutch Shell group), told last month's meeting of ASME's Petroleum Mechanical Conference that a return to the "central plant" principle, formerly available on the steam rig, can be of much help in simplifying problems of machinery, transport, assembly, and maintenance.

Since World War II, Crake said, average horsepower used on drilling rigs has more than doubled, due mainly to addition of larger pumps. Along with the increase in size of rig machinery, he added, there has been an even greater multiplication in the number, and horsepower, of auxiliary equipment, including desanders, degassers, cen-

continued ▶

trifuges, and much larger and more complex mud plants.

The end result, he said, is that rigs have several sizes or makes of engines and auxiliary generating plants with much of the purchased engine horsepower lying idle on a standby basis. Additionally, the size, complexity, and costs of mechanical transmissions have risen "to alarming proportions," he said.

Of the power plants available, Crake believes the DC-ring (constant current system) and the AC-torque converter offer the best present solution to the transmission problem. These are the only two types of power plants which provide the central power plant principle, Crake maintains.

The AC torque converter, Crake said, may increase the profitable useful life of transmissions by 50%. Among his reasons: There is a high interchangeability of generators and power units; the "busbar" system (in which each engine takes an equal share of the load and "full load" rarely occurs) gives power where it is needed; and controls are simple.

Crake reported that both the DC-ring and AC-torque converted rigs are new in the heavy-rig field. One DC-ring rig is now in operation in Holland, and AC-torque converter rigs have been in "successful" use in Germany for the past year or so.

A cost survey by an electrical equipment manufacturer shows that mechanical drives are, on the average, eight times more expensive to operate and maintain than electric rigs.

The study, by General Electric, was based on a survey of 45 contractors. The cost figures include moving, site preparation, rig set-up, operating, and maintenance.

In one case, the study showed, an operator spent $17,000 in site preparation for a mechanical rig. With an electric drive, he simply laid cables over the hilly terrain, at a fraction of the other rig cost. GE claims that the average 10% higher initial cost for electric rigs is more than offset by other savings, particularly in transportation and site preparation, due to the greater flexibility of electric rigs.

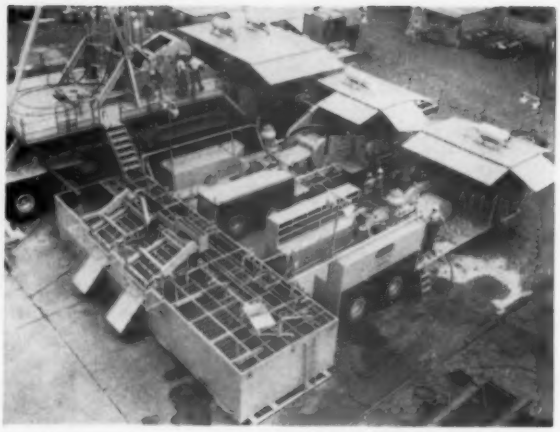
GE says the over-all savings are more important for small rigs, due to the greater number of moves.

One phase of the study showed that for 6,000-ft. holes, an electric rig drilled 53.7 holes per year, taking 6.8 days per hole, while a mechanical rig drilled 45.7 holes per year, or 8 days per hole, in the same area. Total savings for the electric rig in the year: $86,200, not including maintenance or fuel savings. Assuming a rig cost of $370,000 for an electric rig rated to 8,000-10,000 ft., with 3½-in. pipe, the $86,200 saving represents 23.3% of the total rig cost. GE said fuel savings averaged about 15%.

With respect to fuel savings, a California engineer says his company spends about $60 a day in fuel bills for the electric rig, while fuel bills run to about $120 per day for diesel rigs and $60 to $70 per day for gas rigs in that area. It must be noted, however, that electricity is cheap in this area.

With respect to maintenance, the GE survey showed that in one case, a mechanical rig, rated at 5,000 ft. with 4½-in. pipe, cost $19.85 per day to maintain. An electric rig, rated at 7,000 ft. with 4½-in. pipe, cost $4.17 per day for maintenance.

GE says the survey also showed savings in the stock of parts required. One mechanical-drive rig, shipped to Colombia, says GE, required $50,000 in spare parts. For an electrified rig of comparable capacity sent to Colombia, only $15,000 in spare parts was required. "And this is considerably more than a domestic contractor would need," a GE spokesman says, "where $1,100 to $1,500 in spare parts are kept on hand—and much of that not to be used."



IDECO 'DESERT RAMBLER,' called a major advance in rig design, has a 145-ft. Dualift Mast, largest ever set on wheels.

This GE spokesman, noting that cannibalization of rigs has just about run its course, feels that new rigs will soon be needed. He says: "I think we're about at the point where electric drive will make a big spurt forward."

Some of the latest thinking in electric-drive rigs is reflected in several new rigs built and planned.

Slats Honeymon Drilling Co. has just bought an electric-drive rig that will operate with two engines where normally two are required for the drawworks and two for the pump.

The rig reportedly is an advancement of ideas incorporated in Helmerich & Payne's new gas-electric rig (PW—Aug.21'59,p31). The most important feature in both rigs is the arrangement of the drawworks, in which the transmission is removed entirely.

Another gas-electric rig that will be watched closely in coming months is Parker Drilling Co.'s Rig 60, which is said to have a depth capability of 30,000 ft. with 4½-in. pipe (PW—Sep.11'59,p22).

There are some sources, too, that look on the gas turbine as "coming on" as a source of rig power.

One engineer for a southwestern major says it would be possible to attain the degree of power control needed for rig operation by hooking the gas turbine to an electric set-up. "Combining it with an electric drive also would rid the turbine of the objection that too much of its excess speed would be wasted," he says.

The Dallas branch of Solar Aircraft Co. has just sold a gas turbine for use with fracturing equipment.

Solar says it is negotiating with about a half-dozen companies that are interested in gas turbines to operate mud pumps and/or serve as the primary engine for drilling rigs (PW—Jun.5'59,p28).

continued ▶

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DUAL CONCENTRIC DRILL PIPE is examined at test site by John Hetherington (left) and Don Grable, inventor of the system.

New Rigs Are Different

In addition to the stir caused by electric drives in the rig field, other developments point up the continuing evolution of today's drilling rig.

While much attention in recent months has focussed on big new rigs, interesting changes are occurring in other areas. There is, for example, considerable effort to reduce rig weight and increase portability. National Supply Co.'s helicopter rig is an example (PW—Aug.7'59,p31).

One Texas firm is putting a new rig through its final testing and should be ready to announce it before the end of the year. The highly portable rig has several unusual aspects.

This much can be said now: The operator has been drilling with both mud and air. The rig is highly portable, with the derrick, substructure, engines, pump, and so on all mounted on trailers. The derrick folds down for highway travel. The derrick is rectangular, and not very high. The power swivel is powered by two electric motors.

The drill pipe is pipe within pipe. A diamond coring bit is used, primarily. The drilling fluid, or air, passes down the annulus between the inner and outer pipe. The cores are broken into segments by a device within the inner piper and are ejected at the surface into a kind of rotating basket and thence to a slide.

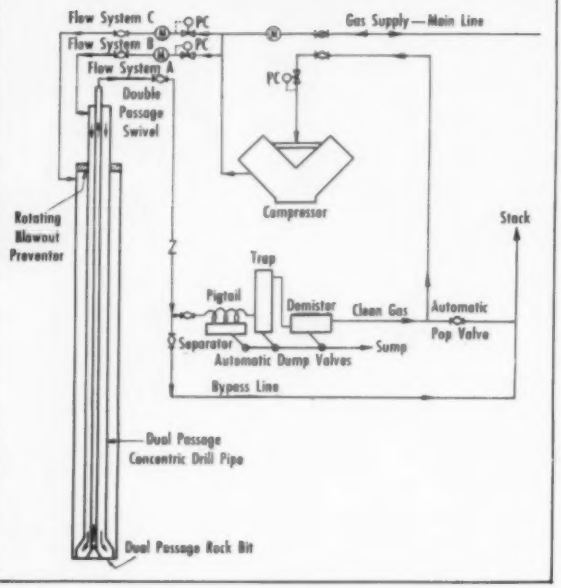
Well Completions, Inc., of Denver, reports satisfactory progress with its closed-circuit drilling system using dual concentric drill pipe for air/gas drilling (picture, above).

Robert W. Sneed, executive vice-president, says the system will apparently permit better completions in low-pressure zones, allow better air drilling (since water trouble will be minimized), and permit faster hole cutting.

The closed-circuit circulating system works this way: The gas drilling fluid enters the dual swivel and flows down the outer kelly and drill string annulus. At the bit face, the gas cools the bearings and sweeps cuttings and any fluids up the central annulus to the surface. Where conventional air drilling might lose returns, the DCDP system maintains a flow of analyzable samples to the surface, according to Sneed.

Well Completions is field-testing the DCDP system for Gas Drilling Service, of Los Angeles, which holds various patents on the process.

Flow Diagram of Closed Circuit Drilling System With Double Concentric Drill Pipe



Another Texas company—Fox Equipment & Derrick Co., Ft. Worth—has come up with a medium-depth, trailer-mounted rig with a telescoping mast. The complete rig—the FEDCO 96-ST-200—is carried in one load.

All material and assemblies not essential for drilling or servicing have been eliminated. The trailer assembly combines a conventional trailer with the special substructure to provide a complete platform for all drilling equipment and eliminates the need for specifically designed "lowboy" types of trailers.

The 200,000-lb. hook-load-capacity mast and substructure are transported to a test site with all drilling equipment in place. The substructure is spotted by driving alongside the test site, removing the lower beam on the side nearest the well, turning the truck at right angles to the substructure, and pivoting the equipment into position (drawings, page 67).

Combination side wind stabilizers and load-bearing screw jacks are used to maintain level operation, eliminating further need of the truck. The mast is moved on rollers to the raising position and pinned at the base. The raising frame is then automatically erected by the mast movement.

Since the 96-ft. mast and substructure accommodate regular drilling equipment, the initial cost of shop assembly is saved by "rigging up" on location.

One of the leading supply companies has recently designed and now has available for delivery a rotary drive unit for rigs in the medium-to-deep depth class which permits installation of drawworks and power source

continued ▸

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"From spud to pay I rig up with...

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says toolpusher "Red" Royal

Hard-driving, hard-working "Red" picks "U. S." products to put muscles on his rig. He knows from experience that "U. S." products are the *best* insurance against downtime he has ever found. They are designed and made by men who know all about oil field problems—men who are out to help the driller get more and more footage—in less and less time—at less cost.

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"In Texas, just one U. S. Royal 4 drilled over 300,000 feet in over 3 years, at a hose cost of less than a penny a foot drilled!" No need to keep money tied up in stand-by hose to finish wells. U. S. Royal 4 handles the highest pressures . . . no downtime in order to switch. No lubrication needed; complete flexibility from nipple to nipple.

"I insist on belts that have proven they wear longer. That's why I always see to it that U. S. Royal V-BELTS are on my rigs."

Take for instance, this performance record: On a compound drive U. S. Royal V-Belts drilled over 218,970 feet of hole, moving from location to location. At last count, they were still on the job after 43 months. The contractor says the belts he had previously used failed after three wells. New cords, new fabrics and new construction have increased the H.P. rating of U. S. Royal by 40%. Yet, with all this, you pay no premium for the new U. S. Royal V-Belts.

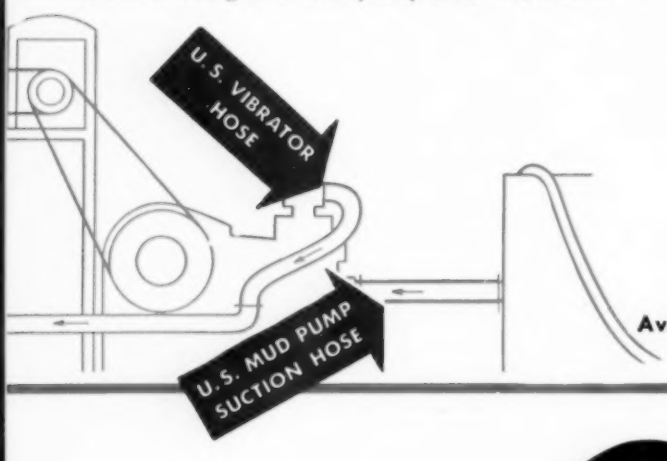
"Withstands the highest pressures met in today's drilling operations." U. S. MUD PUMP VIBRATOR HOSE P-8087.

Standard equipment between mud pump and standpipe. Does away with broken pipe and loose connections. Takes up misalignments between mud pump and mud line. Speeds rig-up time.

"The hose that can't collapse!" U. S. GIANT® HEAVY-DUTY MUD PUMP SUCTION HOSE P-8048.

High flexibility permits quick adjustment of the intake of the line to the right position in the slush pit without changing connections. This hose keeps air out of the line, thus reduces wear on valves and pistons, and often saves 2 or more connections in each line. Will not collapse, thanks to heavy spring-steel coil construction. Handles chemically treated or oil-base mud, or crude oil.

"Red" Royal also relies on plenty of other "U. S." products. "I use other types of 'U. S.' oil field hose," says "Red," "plus 'U. S.' packings and U. S. Royal V-Belts. I always get the best out of my rigs, and 'U. S.' helps me do it."



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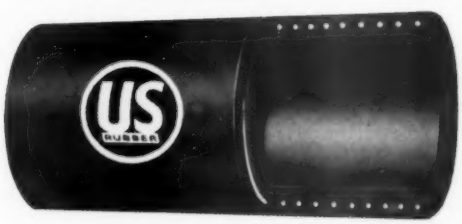
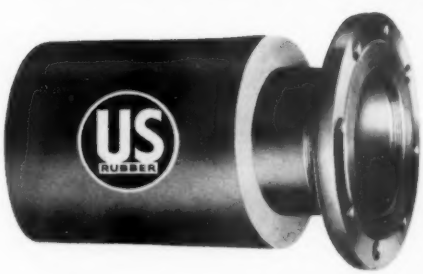
U.S. PEERLESS® ROTARY HOSE—STYLE P-8017 For use wherever API standard Grade A hose is required. Suitable for small rigs at medium or low pressures. Excellent for clean-out rigs. High hydrostatic value. Tube of neoprene provides maximum resistance to oil-base mud. Neoprene cover resists sunlight, oil, abrasion.



U.S. GIANT MUD PUMP SUCTION—STYLE P-8048 For handling chemically treated or oil-base mud, or crude oil. Flexible construction permits quick adjustment of the intake of the line to the desired position on a slush pit without changing connections. Heavy spring-steel coil construction makes collapse of hose impossible.

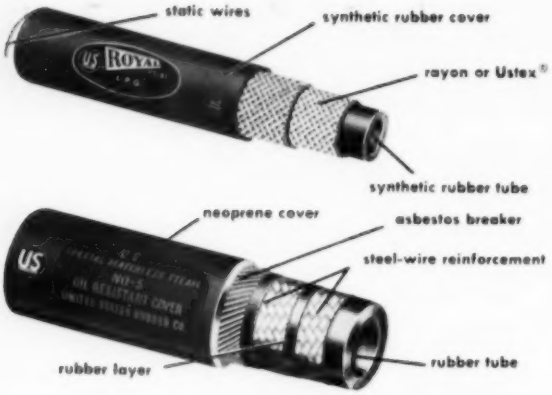


U.S. ROYAL MUD-RETURN LINE—STYLE H-2000 Used as a mud-return line from the drilling platform to the drilling tender. Strong, yet lightweight and flexible. Use of neoprene inside and out gives high resistance to oil, abrasion and sunlight.

U.S. MUD PUMP VIBRATOR HOSE—STYLE P-8087 For a flexible hook-up between the mud pump and the standpipe. Will handle the highest pressures. Saves rig-up time over connections made with steel pipe; flexibility eliminates vibration and does away with broken pipe and loose connections; takes up misalignments between mud pump and mud line, making close alignment unnecessary. Neoprene tube and cover are resistant to oil-base mud, abrasion and sunlight.

U.S. FLEXLITE® FIRE HOSE—STYLE P-1180D This high-pressure, lightweight hose is specially designed for fire protection in petroleum and chemical plants. Lighter than ordinary double-jacket 400-lb. cotton fire hose—to permit faster laying time. High flexibility permits easy coiling and racking. Three-ply laminated tube resists damage by oils or chemicals. Both warp and fill yarns in jacket made of high-strength Dacron*, which is impervious to action of mildew. Coating of neoprene cement for extra resistance to oils and chemicals.

*Du Pont's polyester fiber



U. S. ROYAL LPG HOSE—STYLE P-5141 For fuel-line connections for use on auxiliary equipment. Strong, flexible. Both tube and cover of specially compounded synthetic stock resist permeating action of liquid petroleum gas. This hose surpasses all existing State safety regulations.

U. S. MATCHLESS STEAM HOSE NO. 5—STYLE P-409 Very flexible. Neoprene cover resists action of heat, oil, weather. This hose never bursts—after long service, need for replacement is indicated by slow "bleeding" of hose.

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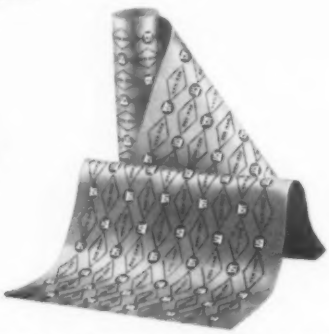
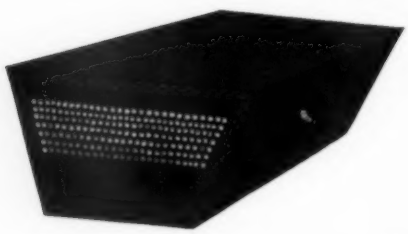


U. S. REDMAN® SHEET PACKING—STYLE NO. 49 Redman sheet packing is designed by "U. S.", the *original* maker of red sheet packings. Style No. 49 is for service against hot and cold water, saturated steam pressures up to 125 pounds, and general hydraulic conditions. First on the market, and always first in performance among red rubber sheets. Standard rolls 36" wide, weighing about 100 pounds, in thicknesses of 1/32", 1/16", 1/8", 3/16", 1/4".

U.S. ROYAL V-BELTS



U. S. ROYAL V-BELTS U. S. Royal V-Belts have *all-new* cords, *all-new* fabrics. These, plus *all-new* construction methods, increase H.P. rating by 40%. That means higher drive capacity at less cost. Using fewer belts and narrower sheaves means less belt cost and less sheave cost. Every cord is built into belts under tension, with errorproof electronic precision to insure that each pulls its share of load. You pay no premium for new U. S. Royal V-Belts.

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U. S. SECURITY® FRICTION TAPE—for all taping and splicing jobs. High physical strength and resistance to tearing. Good surface tack and consistently permanent adhesion. No pinholes. Long storage life.

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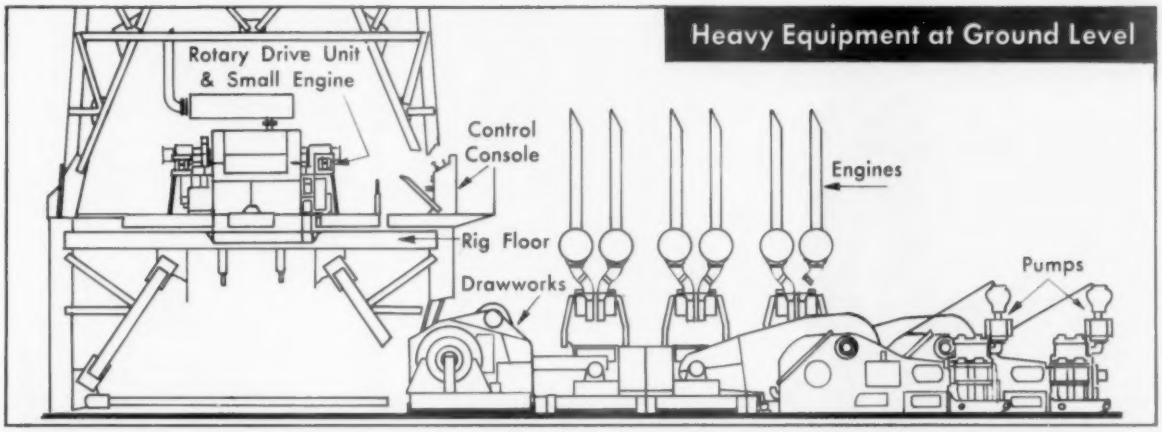


SCHEMATIC shows how rig-up time can be cut by ground placement of heavy equipment, made possible with new rotary drive unit.

at ground level rather than on the rig floor or at some intermediate point.

The company says the arrangement already is proving its worth on an offshore drilling barge and should be equally adaptable to land-based rigs where high substructures are required.

Placement of the drawworks on the rig floor each time a new test is spudded is both expensive and time-consuming. Generally, a loading ramp up to 60 ft. in length is required for rigging up, and must be hauled from one location to the next. The use of an independent rotary drive unit equipped with cathead shaft and sandline drum eliminates the need for placing hoisting equipment on the rig floor. At the same time, it does away with excessive drive distances.

Obvious advantages of such an arrangement include reduction of rig-up time and increased working space on the rig floor. The latter factor ties in closely with other advances being made requiring installation of automation gauges and controls at accessible locations on the rig floor.

And Ideco, Inc., one of the Dresser Industries, has just sent to Libya a new telescoping truck-mounted rig that is highly portable despite the size of the components.

Major components of the rig—called the Desert Rambler—are mounted permanently on five heavy-duty semitrailers equipped with huge sand tires (PW—Sep.25'59, p28). Because of its construction and design, say Ideco, the new rig can be moved 20 to 30 mi. over rough terrain and rigged up on a new location in less than eight hours.

New Bit Cracks Old Barrier

One of the more exciting developments in rock bit design is Hughes Tool Co.'s new sealed-bearing bit.

Development of a sealed-bearing bit has been a prime objective for some years by several manufacturers. The Hughes announcement (PW—Sep.4'59,p33) simply said that the new bit was the result of a long series of field and laboratory tests, and that a detailed report will be made later. Hughes, meanwhile, has set a target date of Jan. 1 to have the first production models of its RG-1J, 8¾-in. size, available for distribution. Other sizes of the insert-type bits will be developed, Hughes promises.

Other improvements in bits are also in the works.

Bit life has been prolonged by improving tooth design and through the use of better metals and alloys. Reed Roller Bit, for example, has a new bit with tungsten-carbide inserts in the cones. It is said to be especially good for extremely hard formations.

And one manufacturer is reportedly trying to develop a bit containing radioactive pellets, which would help to determine when the bit teeth are worn to the point where the bit should be changed.

It's likely, however, that if there are to be any really new and significant advances in rock bits, they will be due to some breakthrough in metallurgy.

One source notes that the materials used today, particularly in the cutters, are materials that have been used for many years. And though many other materials have been investigated, none of them have proved to be any better than what has been standard in cutters for years. Exceptionally hard and strong metals, the source added, might not work because of their brittleness or other undesirable properties. This applies to many of the "glamor" metals.

Lyle Payne, assistant chief engineer for Hughes Tool, believes both the dimensional and metallurgical approaches to rock bit development are being fully pursued today.

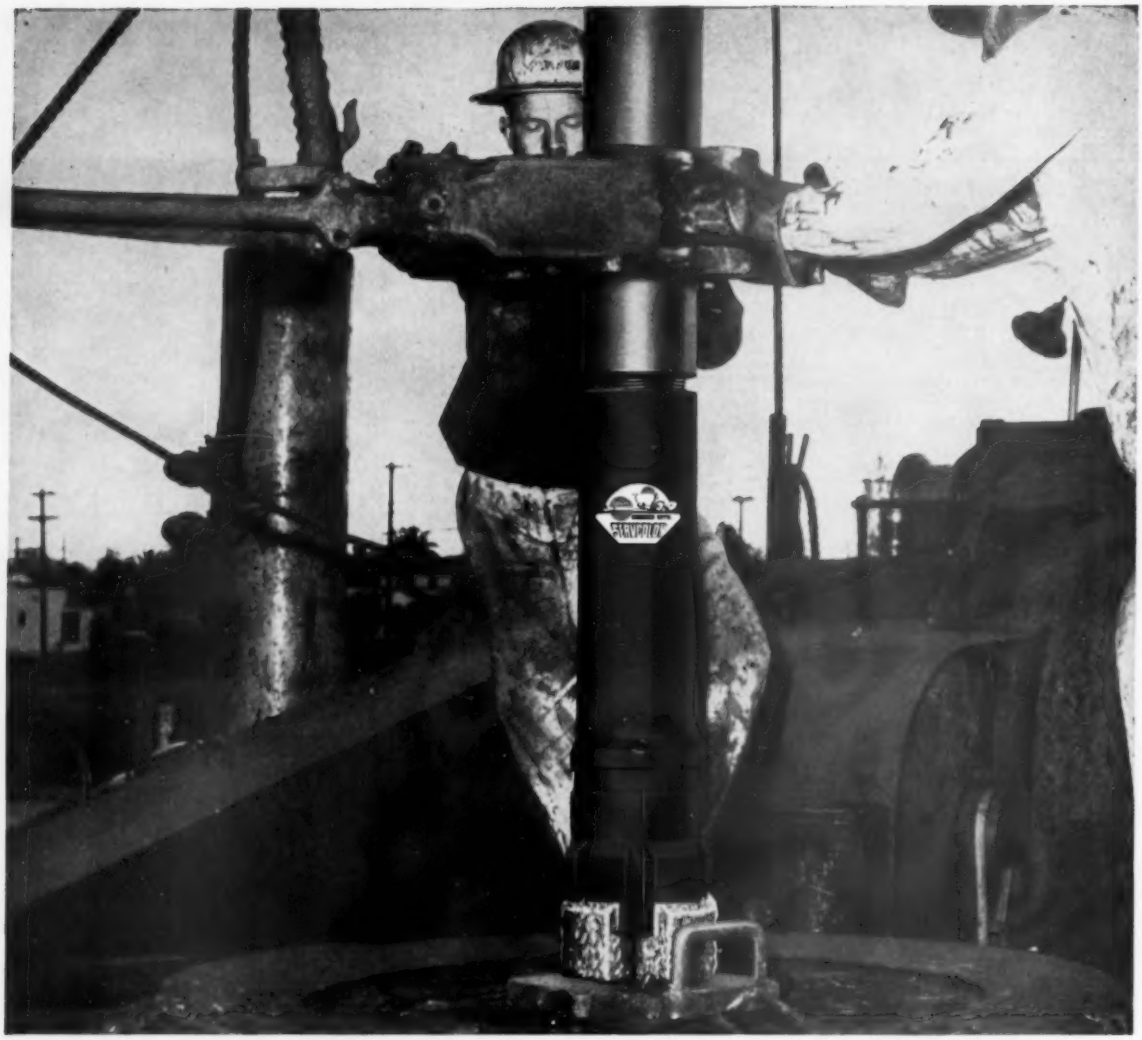
"Where subsurface conditions are suitable," he says, "the greatest breakthrough—all economics taken into consideration—is simply converting over to air or gas circulation. That's the greatest contribution toward the reduction in drilling costs in many, many years."

Reed Roller Bit Co. is pushing bit development for air/gas drilling. The emphasis is not so much on extending bit life as it is on speeding up drilling.

W. M. Koch, in charge of research at Reed, reports that as much as 4,000 to 6,000 ft. are being obtained with one bit run in air/gas drilling. Sometimes, he adds, where the bit has been run more than once (after overhauling), the total footage has been more than 7,000 ft.

"This air/gas drilling is so advantageous that in Pennsylvania they're drilling literally the entire 8¾-in. portion of the hole with just one bit while drilling gas wells,"

continued ▸



Three 6⅛" Bit Cones milled up in 2 HOURS!

Servcoloy-dressed Junk Mills chew up bit cones and other junk with amazing speed; makes this method of removing a fish fast, safe, and very economical.

After three cones from a 6⅛" bit were left on bottom, two rock bits, two hydro-bailers, and two junk baskets were run during a three-day period in attempts to either recover or sidetrack the three cones. Results were negative.

A six-inch Servco CJ Junk Mill dressed with Servcoloy, was then run in the hole. A total of two feet of hole was drilled in a period of two hours of milling. The operator ran back with a bit and proceeded to drill a head. Fine steel cuttings were caught on the shaker during the milling and appeared on the mud screen during the succeeding day, showing that the *cones were actually milled up, not sidetracked.*

Other operators running the Servco Junk Mill report similar results. The astonishing cutting properties of Servcoloy have completely changed thinking about down-hole milling. Why not get complete information from your nearest Servco office?

WHAT IS SERVCOLOY?*

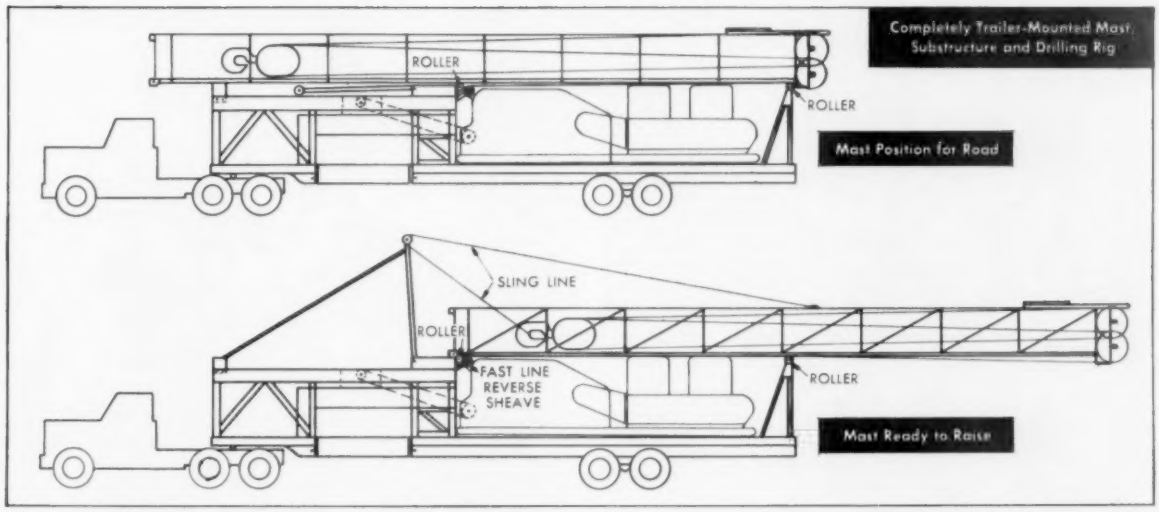
Servcoloy is a patented, hard-facing material which uses a unique method of suspending bits of carbide in a tough, elastic matrix. As the carbide cutting edges are worn away or torn from the matrix, new edges are automatically exposed. Servcoloy is now being used on Servco milling tools such as section mills, rotary shoes, taper mills, pilot mills, etc. Remedial work which formerly took days to do is now being done in hours.

SERVCO

General Offices: 2440 Cerritos Ave., Long Beach 6, California
Gulf Coast and Mid-Continent: 4850 Gasmer Street, Houston 35, Texas
Canada: 6909 - 104th Street, Edmonton, Alberta **Venezuela:** Maracaibo

Field Offices: Ventura, Bakersfield, Lafayette, Harvey, Oklahoma City

*U.S. Patent No. 2,833,638



TELESCOPING MAST on this new trailer-mounted FEDCO rig moves out to raising position on a unique roller arrangement.

Koch says. "The aim in that region now is to drill the entire well with just three bits—one for the surface, one for the main hole, and one for drilling into the formation."

The problem of beefing up small bits, especially for slim-hole drilling, continues to stump bit manufacturers.

Currently available small bits don't hold up as well as larger bits, and this reduces the economic advantage of slim-hole drilling. It's generally held that slim-holing would make dramatic spurts forward should a really tough small bit be developed.

"When everything gets smaller," says Koch, "the strength of the parts goes down, and certain parts of the bit begin to get weak fast. The bearings, particularly, are hard to deal with. The bearing strength goes down much more rapidly than the dimensions would indicate. A 6-in. bit is much less than half as strong as a 12-in. bit."

Humble's M. E. True and C. B. Corley, Jr., stressed these points in their recent report to the Petroleum Mechanical Engineering Conference (PW—Sep.25'59, p26): "A more efficient bit or cutting mechanism is needed that will drill holes as small as 4¾-in. at a rate commensurate with the reduced excavation required . . . Development of a satisfactory small-diameter bit would provide additional incentive for the development of small, highly portable drilling rigs and association equipment, with emphasis on automatic operation."

Nearer: Rig-Floor Automation

Automatic handling of drill pipe on the rig floor is one of the prime targets for equipment manufacturers. Some progress is being made.

One of the bigger steps toward this goal has been the development of two new tools now being offered by Ideco (PW—May22'59,p14). Both new tools—a stabber-spinner for speedier and more precise connections, and automatic dual elevators for better landing and reduced scoring of drill pipe—were developed by William Guier, of Tulsa.

"One of the most difficult aspects of automating drill-pipe handling over the years has been landing the pipe in the same plane each time a connection is made," says Guier. "With conventional slips it's a virtual impossibility."

Service Drilling Co. crews using the automatic dual elevators have been able to reduce round trip time slightly (6 minutes on 9,000-ft. holes with 90-ft. stands) after becoming accustomed to the new system. More importantly, crew fatigue and rig floor hazards were reduced.

Guier says the system now being offered by Ideco is one that can "be placed on any rig and be economical." The stabber-spinner is, however, basically a big-rig device.

The primary purpose behind the development of automatic drilling devices is the elimination of crew fatigue.

"No crew, regardless of how skilled they may be, can stand up to round trips at the depths being reached today without excessive fatigue," says Guier.

Unlike some segments of the industry, he adds, the drilling industry is not seeking to replace men with machines. A minimum number of men per drilling crew are required to carry out routine duties, and that minimum has already been reached.

Tied in closely with the increasing emphasis on rig-floor automation is a weight-control indicator developed by Pennant, Inc., of Tulsa.

The device, called a Safety-Weight, was designed primarily as a safety device to reflect sill and foundation conditions during drilling or workover operations.

"What we've tried to do," says Pennant president Stuart E. Corry, "is give the driller something he can depend on to warn him of foundation conditions resulting from improper footing or high-wind velocities.

"Should a foundation crack or a mast leg sink, the condition shows up instantly on a gauge mounted over the console, and the driller can shut down the rig and make repairs without endangering life or equipment."

The instrument gauge is mounted anywhere on the rig

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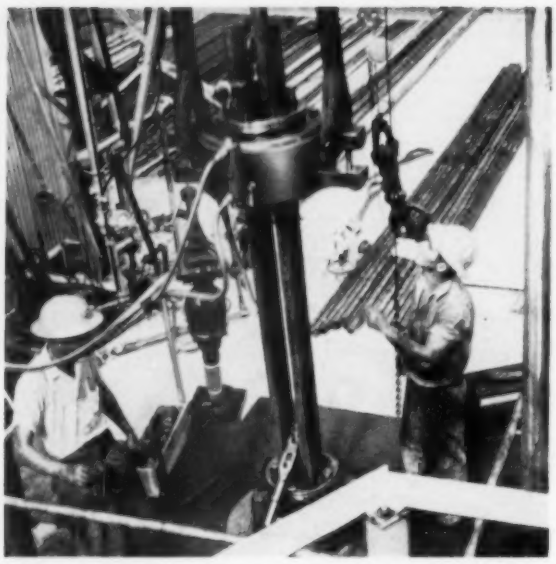
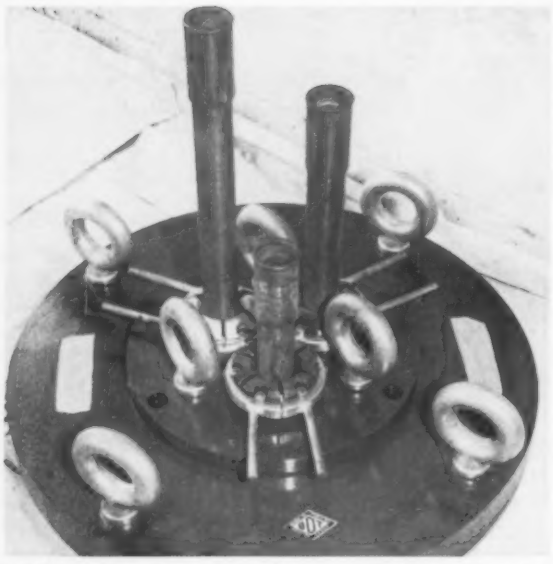


FOUR STRINGS of tubing are being run simultaneously with Brown Oil Tools' new multiple-string slips and elevators.



CLOSEUP shows how retainer ring, segmented inserts, and tubing slips are set up to handle running of four tubing strings.

floor, thereby giving the driller a visual indication of the structure load as well as the hook and foundation loads.

Main application of the device so far has been on workover rigs and pulling units, but several now are in use on trailer-mounted drilling rigs.

Brown Oil Tools, Inc., of Houston, has come up with new elevators and slips that permit running of as many as three or four strings of tubing at a time.

The new assembly, consisting of an elevator, retainer ring, segmented inserts, and tubing slips, permits lowering of tubing strings and packers simultaneously. Besides greatly reducing the running time of tubing, the new assembly, which can be equipped with three or four slips, is a greatly simplified method of running tubing and packers for multiple completions, a Brown Oil spokesman says. The device is also said to eliminate problems in stabbing tubing and damage to stringers.

A new analysis system is now available that will provide a more precise determination of fluid levels and densities during drilling operations. The hope is that it will lead to truly automatic means of controlling mud during drilling.

The new system is built around two compatible tools engineered and built by Halliburton. One of the tools, Halliburton's well-known Densometer, has proved itself during the past two years as an aid in controlling cement slurries. The other, known as the Pitometer, is just being introduced after months of field and lab testing (PW—Oct.2'59,p21).

The Densometer gives a continuous measurement of the density of drilling fluids. The complimentary Pitometer is designed to measure the fluid level through a range of 75 in. Together, the devices make possible the visual gauging and permanent recording of two of the most vital factors affecting the mud stream during the drilling operation.

Coming: Better Tubular Goods

The effort to develop automatic pipe-handling equipment is only one facet of the attack against indentation and notching of drill pipe, casing, and tubing—one of the most urgent problems facing manufacturers of oilfield tubular goods today.

Although the problem has been with the industry for some time in a relatively minor way, it has been compounded recently by the advent of the high-tensile-strength pipe required for deeper drilling and longer pipe strings.

Slip damage to high-tensile-strength drill pipe used in deep wells is more severe than that done in conventional pipe because tensile strength is attained primarily through the addition of various alloys to the basic steel formulation.

Addition of these alloys tends to make the pipe harder and more brittle, reducing its ductility.

The dilemma presently is being subjected to attack from three quarters: (1) Steel companies are striving to improve their processing; (2) contractors and oil companies are appraising their crews of the dangers involved; and (3) automatic dual elevators that eliminate slips have been developed.

Current research by the steel industry is aimed at retaining or even increasing strength, while reducing brittleness. The main line of attack has been better processing and closer alloy control.

One of the more recent innovations in making high-strength pipe is the quench-and-temper process now being used by two pipe manufacturers.

This method involves subjecting the pipe to an even heat and rapidly cooling (or quenching) it in a water bath. This is followed by another tempering treatment at

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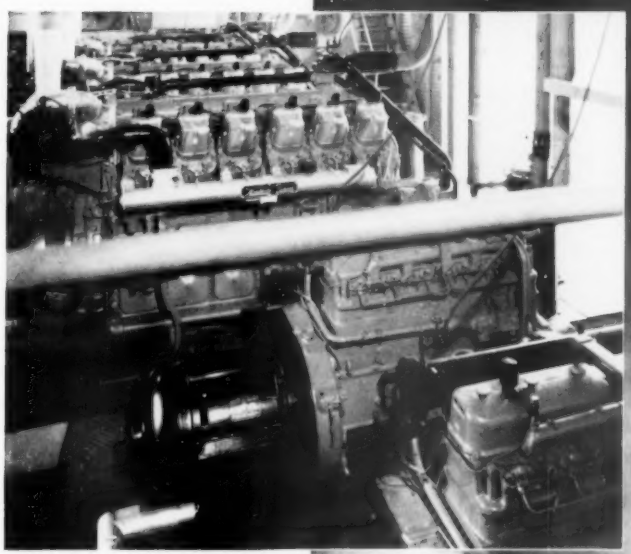
On the drilling barge "TEXAS"

All the Power is WAUKESHA



Three Waukesha turbocharged Diesels for drilling and pumping

Two Waukesha Diesel Enginators supply all electrical needs

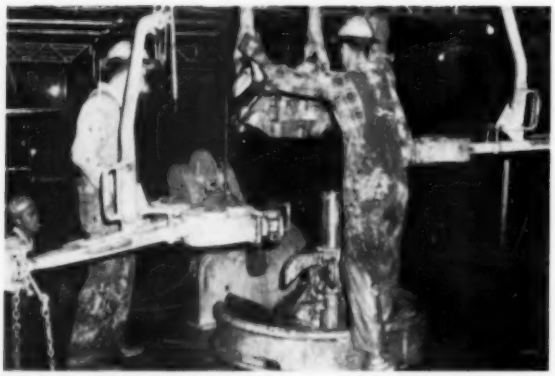
•

Drilling barge "Texas" is owned by Sharp Gulf Drilling Co., Inc. New Orleans, La.

Drilling at Texas Gulf Producing Co. location near Bourg, Louisiana, the drilling barge "Texas" . . . owned by Sharp Gulf Drilling Co., Inc., New Orleans, Louisiana . . . is all-Waukesha powered. Driving through a Model A295-100-12 National torque converter, three Waukesha Model VLRDBS Turbo-Supercharged Diesels—12-cylinder, 60-degree vee, four-cycle, 8½ x 8½-inch bore and stroke, 5788 cubic inch displacement, with counterbalanced crankshaft—power the Model B3661 Bethlehem drawworks and two 8-inch bore x 16-inch stroke Model B1640 Bethlehem pumps. Two 100 KW Model WAKDU Waukesha Enginators (engine generator sets) supply all electrical requirements. Send for descriptive bulletins 1663 and 1648.

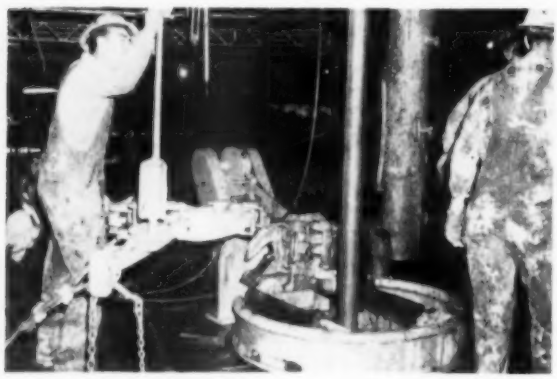
448

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / **New York • Tulsa • Los Angeles**
Factories at Waukesha, Wisconsin and Clinton, Iowa



1 Empty elevator, one of dual automatic elevators developed by Ideco, is placed in "set-back" position on guide tracks.

2 Links bails have dropped free after the empty elevator has been set down, and elevator holding string is about to go up.



3 String is being pulled. One elevator is in the derrick and the other is in set-back position on the guide tracks.

4 Elevator tracks show clearly in this photograph, taken later, when pipe was being nosed down after being pulled.

closely-controlled temperatures, after which the metal is allowed to cool more slowly.

Application of this process, however, is limited presently to non-upset pipe. Thus, with oilfield tubular goods, the quench-and-temper process is limited to casing. Indications are that steel manufacturers soon will succeed in extending its use to drill pipe and tubing, with their external and internal upsets.

Another process, known as normalizing, also has found application in the manufacture of high-strength pipe. Similar to quench-and-temper, this process also is a heat treatment applied to the pipe during finishing operations. Its close control is one of the secrets of steelmaking.

Alloy control is another important aspect of the manufacture of high-strength pipe.

If too little alloy is added, the pipe lacks the necessary strength characteristics; if too much is added, the pipe becomes brittle and loses its ductility.

The highest-strength pipe commercially available today is API grade P-105, which has a yield of tensile strength of 105,000 psi. Tool joints currently are built to much greater strength requirements.

Despite ductility limitations of present high-strength pipe, the steel companies say they are designing more toward deep drilling than medium depths, right now.

A relatively new Odessa (Tex.) company is offering a service it claims will increase the life of drill pipe by 30% or more.

Metal Life, Inc., specializes in shot-peening, a process that improves the quality of steel surfaces by cold hammering with hardened steel balls (picture, page 42).

Metal Life, which just last week was purchased by Keneipp Contracting Co. of Mt. Carmel, Ill., describes it as "a modern method of blacksmithing."

The principle has proved effective in other industries for years, but is just now being tried in the oil industry, a company official says. For that reason, it may take as long as four years to evaluate completely the value of the process to the oil industry, he says.

The spokesman says his firm shot-peened one 9,000-ft. string of pipe which had been used to drill some 175,000 ft. of hole and had been through several fishing jobs. The pipe showed a high degree of corrosion and was averaging six failures per well. After shot-peening, the pipe was used to drill three 7,500-ft. holes, with no failures.

In cold hammering, the pipe is bombarded inside and out with steel pellets about the size of No. 9 birdshot. The process is also being used on tubing and sucker rods.

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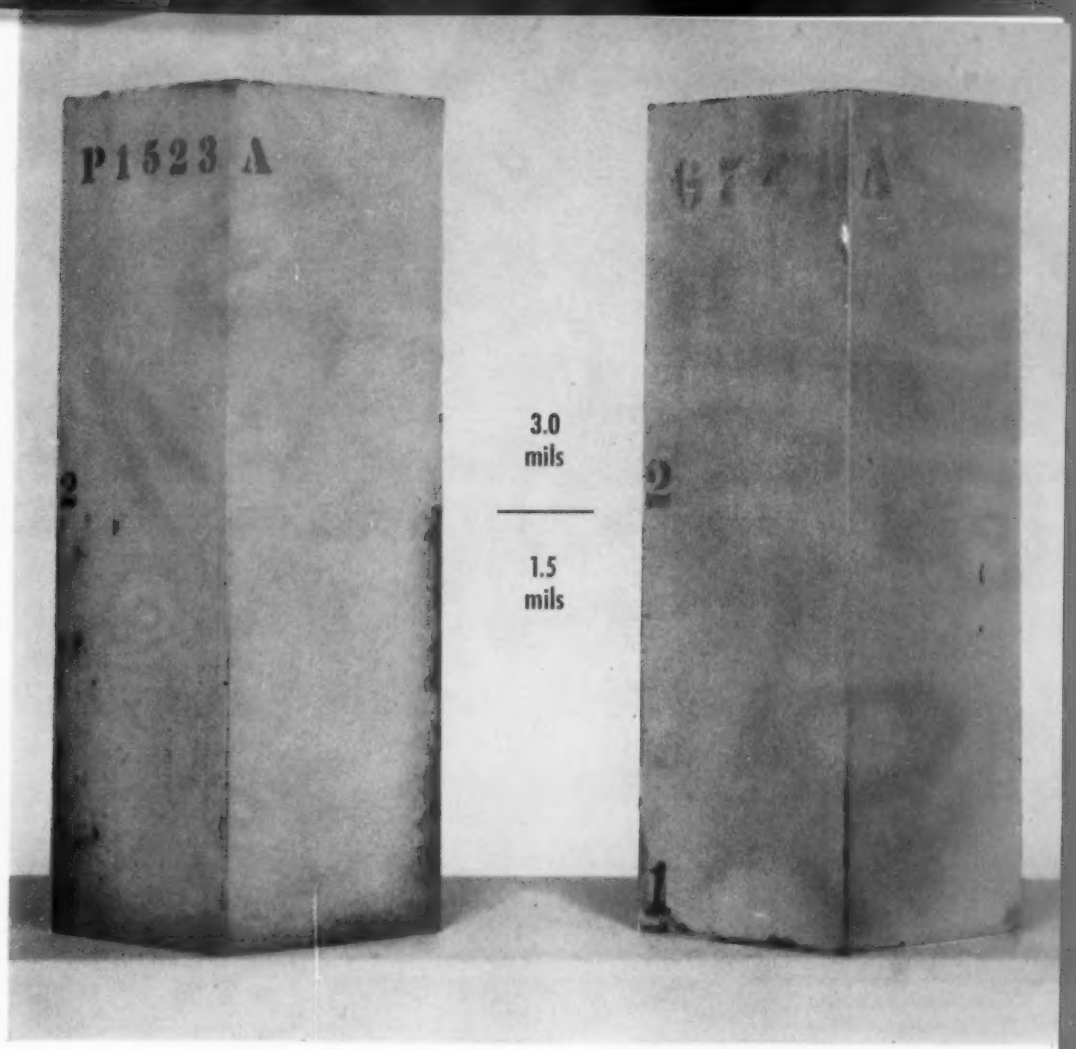


Never before such durable protection, never before such lasting appearance in metal protective paints.

Proof anti-corrosion finish paints made with M50® pigment give unique freedom from bilging

Compare . . . for color . . . the gray alkyd finishes on the two exposure test angles shown above.

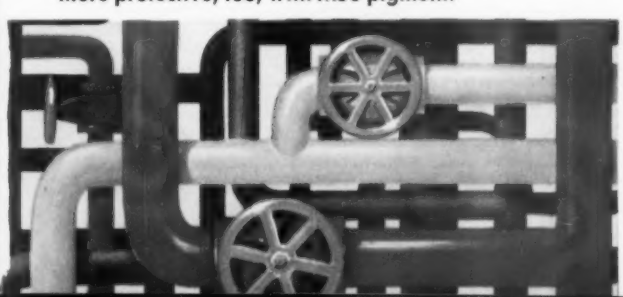
By all previous concepts for anti-corrosion paints, the one on the left should be the darker, should show some splotchiness . . . even though the paint on both angles came out of the same can. That's because the angle on the left was exposed (four years, 45° S) to the heavily sulfur-laden industrial atmosphere of Perth Amboy, N. J., while the angle on the right was exposed (four years, 45° S) only to the normal atmosphere found at National Lead's Sayville, L. I. Test Station.

As you can see, the color difference . . . bilging . . . that you might expect from SO_2-caused precipitation simply has not developed in this paint made with *M50* pigment.

Combined with its unique resistance to discoloration by the chemicals found in industrial atmospheres, fused M50 basic lead silico chromate pigment demonstrates exceptional rust inhibitive action.

Now, with *M50* pigment, your regular paint suppliers can provide standard or heavy-coat anti-corrosion primers, intermediates and finishes with superior rust inhibition, superior weather resistance, and excellent tintability. Paints that are more durable and don't bilge. The *M50* pigment is suitable for use with a wide variety of vehicles.

Color code paints look better longer, are more protective, too, with M50 pigment.



See, on the next page, more details . . . and how you can get these new, much more durable anti-corrosion paints.

M50 pigment is a product of National Lead Company

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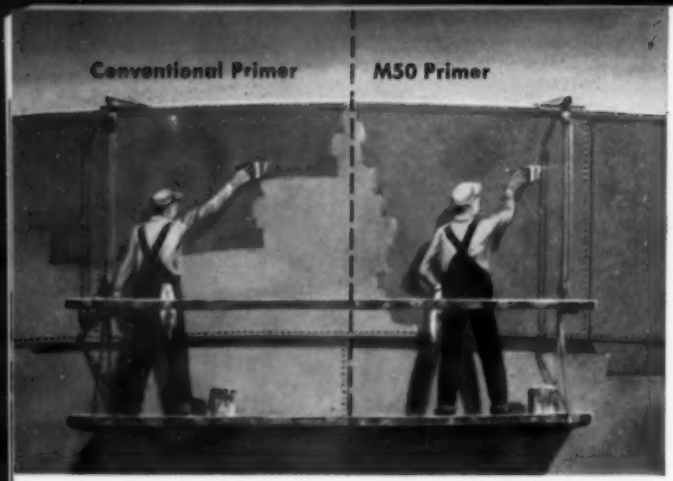
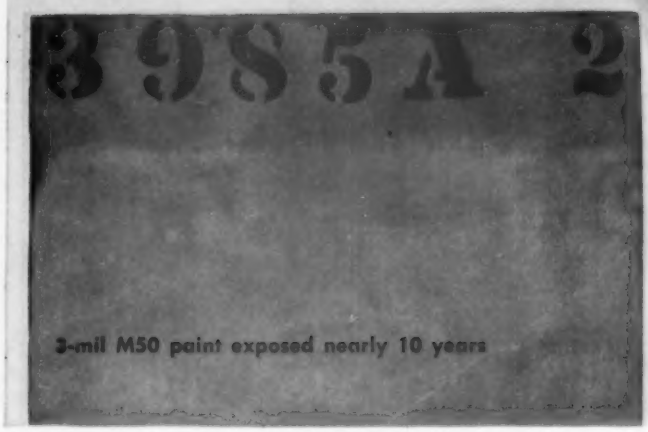


Weight for weight, anti-corrosion paints made with high-bulking M50 pigment cover 40% to 60% more steel.



Mil for mil, M50 paint films show better rust-inhibitive performance, lengthen the painting cycle interval.

Here's evidence M50 pigment paints reduce anti-corrosion maintenance painting costs two ways

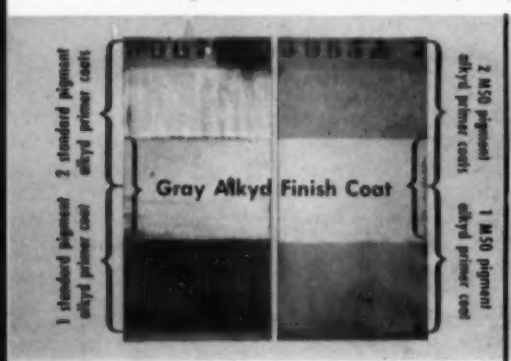
On the preceding page you have seen evidence that *M50* pigment paints are unique among anti-corrosion paints for anti-bilging properties. Exposure tests at National Lead's Sayville, L. I. Test Station have demonstrated these metal-protective paints are also unique for their anti-corrosion action, their weather-resistance, their color stability and many other performance characteristics.

Above you see evidence that *M50* pigment paints are equally unique in their ability to provide anti-corrosion maintenance painting economy. The illustration at left gives you a visual comparison between the coverage of a conventional anti-corrosion primer and an equal weight of an *M50* counterpart of this same primer (Fed. Spec. TT-P-86a, Type I). Clearly a given weight of *M50* pigment paint goes further.

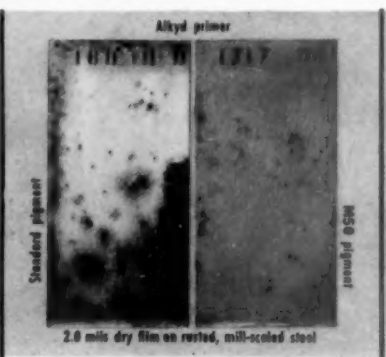
The picture at the right shows the condition of a 3-mil *M50* pigment *primer* exposed nearly 10 years *without a finish coat.* You can see that even in this severe test . . . an unprotected primer . . . anti-corrosion action is still being obtained. The repainting surface is still in good shape. Weather has not adversely affected protection. Imagine how many years of service you can anticipate from anti-corrosion *M50* finish coats applied over anti-corrosion *M50* primers in the normal or heavy coat systems!

Based on cost per sq ft per year, M50 pigment paints can greatly reduce the cost of your anti-corrosion maintenance painting.

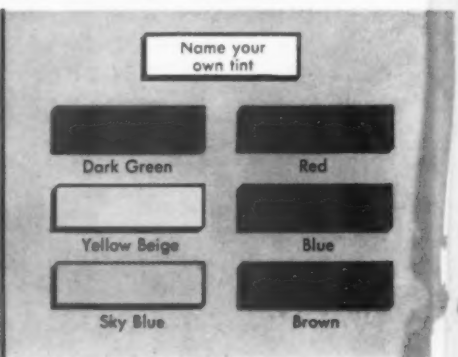
Why M50 Defense in Depth paints give anti-corrosion beyond all former concepts


2 standard pigment alkyd primer coats
1 standard pigment alkyd primer coat
Gray Alkyd Finish Coat
2 M50 pigment alkyd primer coats
1 M50 pigment alkyd primer coat

Exposed 9 years, 45°S. Each coat 1.5 mils
Proved corrosion and weather resistance



Exposed 45°S, 1 yr ind. atmos, 1 yr normal atmos.
Proved outstanding for film strength, durability



Colors above available in conventional and heavy-coat paints
A wide range of stable colors can be produced

Are you concerned with tank or structure maintenance painting in your firm? If so, you are invited: (1) to visit National Lead's Sayville, L.I. test station, where you will see the results of the 20 years research that lies behind the *M50* pigment particle and the more than 10 years of exposure testing that lies behind *M50* pigment Defense in Depth paints; (2) to send coupon below for National Lead booklet, "Defense in Depth" and typical *M50* tank paint specifications.

Next time you purchase, specify *M50* pigment paints. Any paint manufacturer can supply you.

M50 Defense in Depth

National Lead Company,
111 Broadway, New York 6, N. Y.

Gentlemen: Please send me the "Defense in Depth" booklet together with typical tank paint formulas and color chips that I can use in specifying M50-type tank paints.

Name_____ Title_____

Firm or Dept._____

Address_____

City_____ State_____

Tubing as Casing Cuts Costs

One of the more significant—and growing—methods of reducing well-completion costs in recent years is the use of tubing as casing. Such tubingless completions cut tubular goods requirements and permit use of scaled-down equipment.

Though this technique was used as early as 1942, recent developments in permanent well completions have increased use of small-diameter casing. Too, the rise in cost of tubular steel goods, and possible higher future costs, can be partly offset by a reduced tonnage consumption, such as can be effected by tubingless completions. In most such completions, conventional 2⅞-in. O.D. tubing is cemented in place as casing.

Humble's True and Corley said that, while current tubingless-completion techniques permit efficient completions and important economic savings, "it is important that development work continue to obtain equipment and techniques specifically designed for small-diameter wells."

Cost studies show tubingless completions can effect big savings in completion costs.

Costs of drilling, however, remain much the same as in conventional wells. Though holes can be smaller, all rigs are not sized to the jobs, and bits in smaller sizes are not as effective as larger, conventional sizes.

True and Corley reported on one operator who completed 92 single tubingless completions in Texas, Louisiana, Mississippi, and New Mexico, at depths ranging from 1,400 ft. to more than 10,000 ft. His savings, they said, averaged 19% over conventional well costs. Most of the savings resulted from the use of less steel, but they also included some saving from other completion practices that could have been applied to conventional wells.

One major company has just completed a cost study of tubingless completions showing that it would save more than a half-million dollars on a drilling program reflecting one division's activity in 1958.

The study shows that on wells averaging 4,400 ft., savings of $7,925 per well would be realized as compared with a 5½-in. x 2⅜-in. program, and $3,500 per well would be saved as compared with a 4½-in. x 2⅜-in. program.

The study showed the company would save $514,000 by using tubingless completions in 110 wells—the number that were suitable for such completions in the one division last year. This includes 100 single and 10 dual completions. Total tubular costs for the 110 holes with conventional 5½-in. x 2⅜-in. pipe would be $1,563,000; for 4½-in. x 2⅜-in. completions, the cost would be $1,120,500; and for tubingless completions, using 2⅞-in. tubing (two strings in the dual completions), total tubular costs would be $672,500. The $514,000 is a weighted figure based on proportionate division use of 5½-in. and 4½-in. pipe last year.

Stekoll Petroleum Co., an advocate of slim holes and tubingless completions, estimates it is saving about 25% per well in its current drilling program in the Texas Panhandle.

Stekoll had five rigs running in the area, at last report, and has been completing wells at the rate of six or seven per month. Stekoll's program is primarily developmental.

The biggest element in Stekoll's cost-saving is its use of 2⅞-in. tubing for casing after drilling a 7⅞-in. hole. Here's how Stekoll is saving by using the tubingless completion technique:

On an 8,000-ft. hole in that area, the cost of 5½-in. casing for a conventional dual completion would run about $1.75 per ft. The two strings of 2-in. tubing would cost about $1.40 per ft., for a total cost of $3.15 per ft. for tubular goods.

With the tubingless method, however, the cost would be only $1.82 per ft. for two strings of 2⅞-in. tubing.

The total tubular-goods cost for the conventional completion would amount to about $25,200; for the tubingless completion it would be around $14,450.

Drilling with Casing Tested

Several operators are drilling with casing and cementing it in the hole. The method, however, seems applicable so far only to shallow holes (less than 4,000 ft.)

Continental Oil Co. has used the method in Canada, the Rockies, and the Wichita Falls-Abilene (Tex.) areas as a method of cheap completion. Says a spokesman: "It works if you can drill and complete a hole in 9 or 10 days, to 3,000 ft. or 4,000 ft., and if you're not in crooked-hole country. If you're in the hole too long, or get too deep, then you're crazy to try it." He adds that it cuts costs quite a bit, "but you sure better have the right conditions."

The Conoco spokesman says the company usually drills a 6⅛-in. or 7⅞-in. hole, using small casing, drills to total depth, and cements the bit in the hole. "We cement all the way to the surface to be sure we don't have any collar leaks," he adds.

One Texas operator doesn't believe drilling with casing is very practicable except for gas wells in areas where many wells are to be drilled and drilling is inexpensive. This operator notes that the small diameter of the casing makes fishing jobs more complicated and increases the danger of losing the hole.

Several other operators point out that casing threads won't stand up through many bit changes, and that the casing isn't strong enough to withstand the torque, especially at deeper levels.

One Louisiana operator is considering using the technique in shallow offshore water, using 4-in. pipe and cementing it in place no deeper than 4,000 ft. Gulf Oil is already using the method to a limited extent in offshore Louisiana drilling, using 9⅝-in. surface pipe, cementing it and the bit in, then kicking a directional hole through a window.

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SEAMLESS DRILL PIPE • CASING • TUBING

PIG containing radioisotopes goes into lube line at Esso Standard's Bayonne (N. J.) refinery. Later . . .

RADIATION DETECTOR is used to locate a pig that has become stuck inside the pipe. This is one of many ways in which . . .

Refiners Step Up Use of Isotopes

The use of radioisotopes to measure, monitor, or control processes in the petroleum and petrochemical industries is becoming increasingly popular, as industry and the public come to realize that their application is entirely safe.

This was brought out recently both in a panel discussion by U.S. and foreign technicians at the Third Industrial Nuclear Technology Conference in Chicago, and at the meeting in Casper, Wyo., of the Western Petroleum Refiners Assn.

D. H. Hull, of California Research Corp., and W. A. Wilson, of Standard Oil Co. (Ind.) reported on the progress of nuclear technology in oil refineries at the Chicago meeting, while J. S. Bernier and R. W. Lockhart, of Carter Oil Co., described to the WPRA meeting the latest uses of radioisotopes in Carter's refinery at Billings, Mont.

"Deterrents to the use of isotopes," said the Carter engineers, "have been principally a lack of information as to present and potential uses, and a reluctance to use materials which have been popularly associated with the atomic bomb."

"Misinformation, prejudice, and unfettered imagination," Geo. Foster, vice-president of Industrial Nucleonics Corp., told PETROLEUM WEEK this week, "had scared the workers of a certain refinery so much that they gladly made an incredibly long detour, involving coming down and climbing up two sets of stairs, rather than pass near a radioisotope container, fully shielded—which gave a radiation intensity no greater than that of a luminous-dial wristwatch."

What makes radioisotopes so safe for industrial applications is principally the extremely minute doses of radiation that are required.

The highest field that would be used in any accessible point in industry, according to Foster, is about 100 milliroentgens per hour. If a man were exposed to such a radiation with his entire body for one full day, he would accumulate a level of radiation no greater than that used in treating a gastro-intestinal ailment.

Compared to the hazards of high-voltage electricity, dangerous fumes, or poisonous chemicals, with which industry is coping daily the hazards of radioisotopes are minor.

The Atomic Energy Commission has established the maximum permissible radiation dose that can be safely received in any one week, and also a maximum total lifetime dose. Average exposure of workers in refineries is only a very small fraction of this AEC maximum.

"The unequaled sensitivity and

● A FEW DEFINITIONS

ISOTOPES

Two or more forms of the same element, having identical chemical properties, but a different number of neutrons in the atomic nucleus.

RADIOISOTOPES

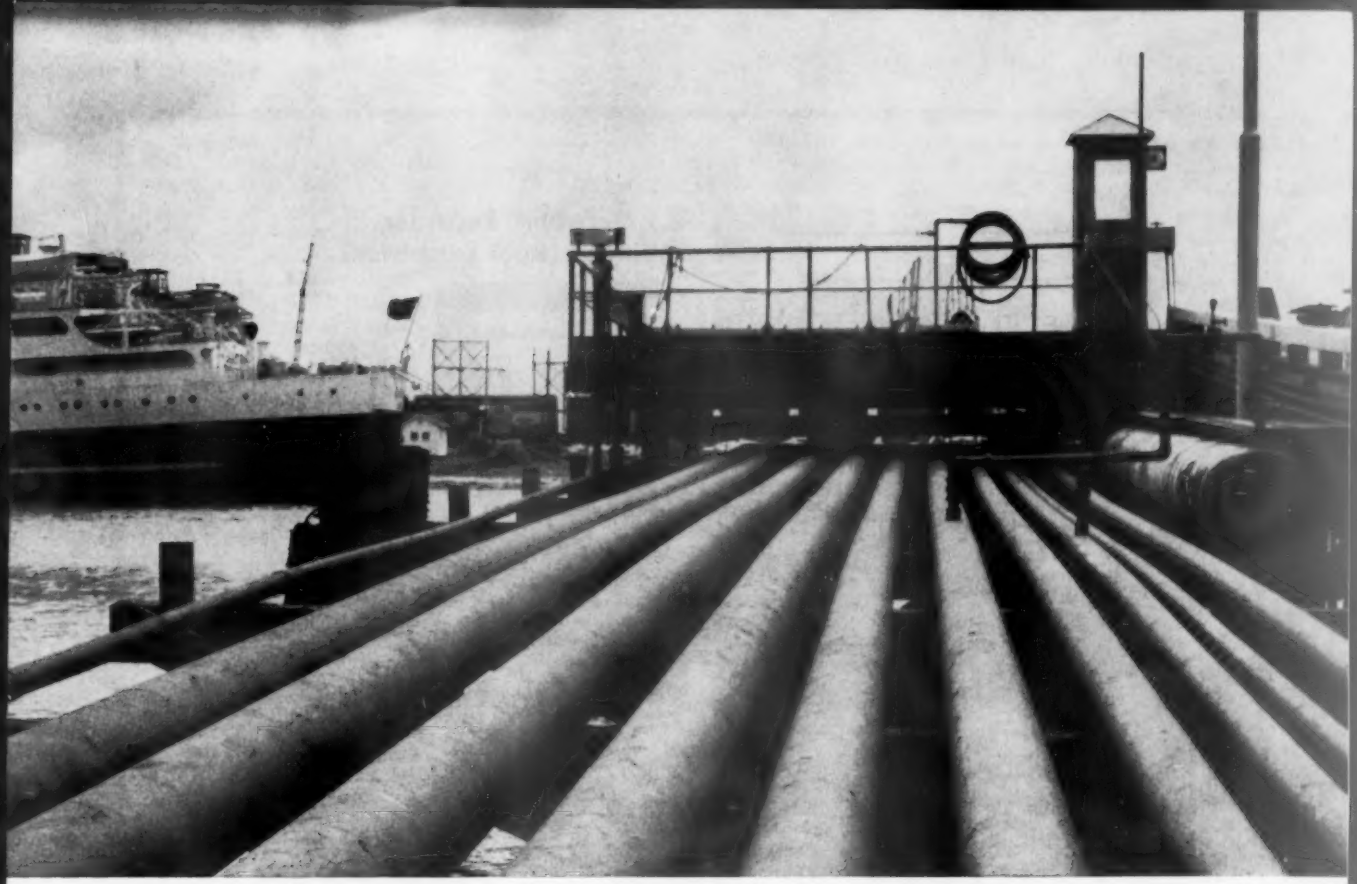
Isotopes which, because of the number of neutrons in the nucleus, are unstable, undergo spontaneous disintegration, and emit radioactive waves in the process.

HALF-LIFE

The time required for half of the atoms of a radioisotope to disintegrate. The rate of disintegration of any radioisotope is a constant which is directly proportional to the quantity that is present. Thus, half of any given quantity will decay in a certain time; it will take the same amount of time for half of what is left to decay, and so on. Isotopes are known whose half-lives are measured in billionths of seconds; others run to billions of years.

ROENTGEN

The measure of the intensity of radiation. One roentgen will produce ions carrying one electrostatic unit of electricity in 1 cc. of dry air at normal pressure and temperature. For industrial purposes, the unit usually used is the milliroentgen, which is one-thousandth of a roentgen.



Doyle Harris, Terminal Supt. for Pontiac Refining Corp., says:

"We like both the long service life and easy application of Bitumastic coatings"

Pontiac's 45,000 bbl/day refinery at Corpus Christi, Texas ships much of its finished product from deep-water loading facilities, completed in 1953, which can handle 15-20 tankers a month.

Terminal superintendent Doyle Harris has the responsibility for maintenance of these docking facilities and the miles of pipeline leading to them. And, as Mr. Harris puts it, "These dock lines take a beating. Salt spray and actual immersion during storms cause severe corrosive attack on the steel."

Before deciding on a standard coating system for these lines, Mr. Harris conducted an "on-the-job" test of various coatings. The Bitumastic system tested consisted of one hand-brushed coat of Bitumastic No. 50 with a second coat of Bitumastic No. 28, specially formulated for outdoor exposure, applied in the same way. "The combination of these two Bitumastic coatings increased coating system life on these lines 100%," says Mr. Harris, "and application is so simple, we can use unskilled labor to do the work." Pontiac uses these coatings elsewhere, too, for protection of tank roofs and lines in both terminal and refinery areas.

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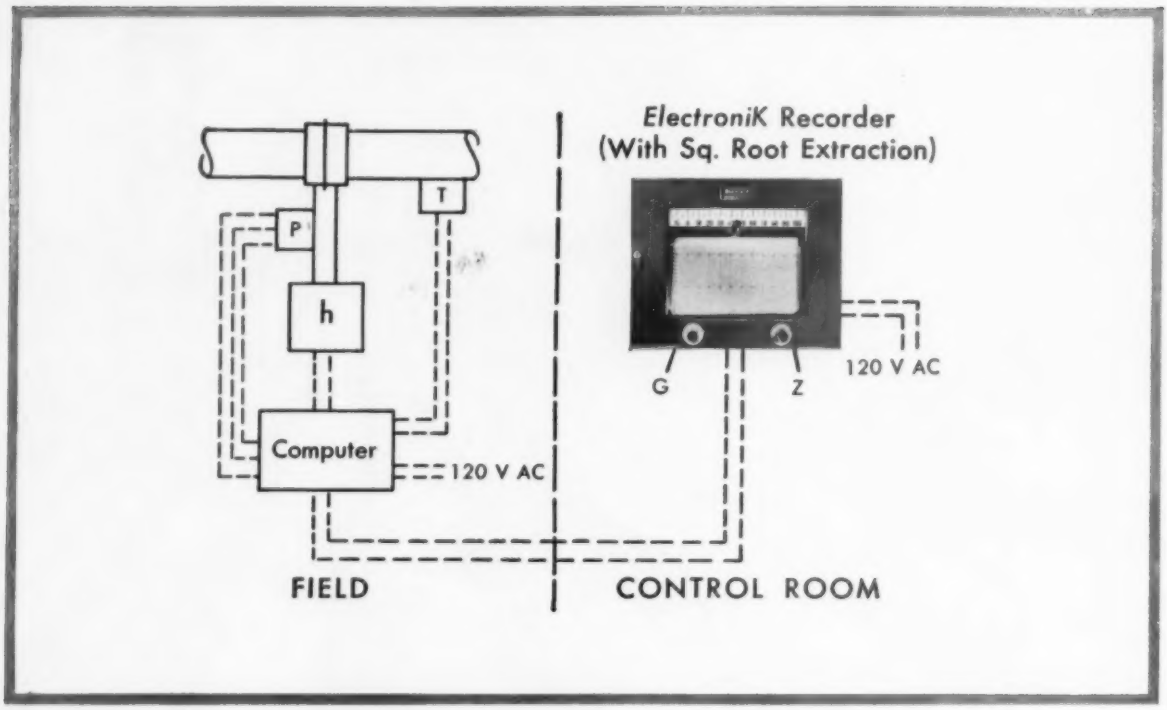

New Honeywell all-electric Gas Flow Computer

measures and records mass flow rate automatically and continuously

Here's how the Honeywell gas flow computer solves a gas flow equation:

$$Q = K\sqrt{\frac{hP}{TGZ}}$$

Where **Q** = mass rate of flow, scfh
h = differential pressure, inches of water
P = static pressure, psia
T = flowing temperature, °R, (°F + 460)
G = specific gravity
Z = super-compressibility
K = orifice flow constant

The *ElectriK Tel-O-Set* △P/I transmitter measures *h*; an absolute pressure transducer measures *P*; and a resistance thermometer bulb measures *T*. The analog computer multiplies *h* by *P* and divides by *T* . . . and sends a resultant millivoltage to the *ElectroniK* recorder. The recorder applies the correction factors G and Z, extracts the square root, and records the resultant mass flow Q.

Easily linked to telemetering and remote control systems, supervisory control, data handling and industrial process computers.

No more tedious, time-consuming calculation of gas flow. This versatile gas flow computer does it for you . . . automatically, continuously. It measures and records gas flow in terms of standard cubic feet per unit time, and is the only all-electric system of its kind.

The Honeywell gas flow computer consists of an *ElectroniK* strip chart or circular chart recorder, a power supply, a standard resistance thermometer, an absolute pressure transducer, a voltage-divider type computing circuit, and an *ElectriK Tel-O-Set* differential pressure-to-current transmitter. The transmitters, transducers and computing circuitry can be mounted *near the orifice*, and only two wires bring the signal into the recorder in the control house. Field-mounted equipment available in explosion-proof housings.

There are many optional accessories. The recorder can be supplied with pneumatic or electric control, retransmitting slidewires, digital encoder, motor or servo-driven control index or pneumatic *Indexet*, hi-lo alarms, auxiliary contacts, pulse telemeter transmitter, and many other options.

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First in Control

specificity of radioisotopes," says Dr. Jane Connor, head of the radiochemical laboratory of Evans Research & Development Corp., "provides the chemist with the most powerful analytical tool ever developed for studying complex processes. Their radiation can be traced or measured in minute quantities, such as a hundred-millionth of the amount detectable by other means."

Of course, proper location, shielding, and directional beaming of radioisotope substances is always carefully planned, to avoid over-exposure of personnel to radiation, no matter how minute they may be.

Insurance companies have taken a realistic approach to the problem of radioisotope applications in industry, and their evaluation of risks is leading to workable, economic rates, according to Foster.

The use of radioisotopes in refineries makes it possible to solve certain problems which it would be difficult or expensive to solve by other methods.

The isotope technique frequently gives more accurate results than other methods, and adapts itself more readily to automation and to repetitive or continuous measurements.

"The increased availability, low cost, and safety level of isotopes," Dr. Connor asserts, "now offer science and industry infinite applications. The time is coming when the industrial utilization of radioactivity will be as familiar and basic as that of electricity."

There are two ways in which isotopes can be used in refineries.

In the first technique, a radioactive isotope is sealed in a well-shielded capsule, allowing the radiations to escape through a single opening. These radiations, which travel along a straight line, are received on a detector—such as a Geiger counter.

The less obstruction there is between the "source" and the "detector," the higher the intensity read on the detector. Therefore, the intensity of the radiation recorded on the detector is an indication of whatever happens to be positioned between the isotope source and the detector.

In the other technique, a lose radioisotope tracer is incorporated into an element entering into a physical or a chemical process. That element is thus "labeled," and the detector makes its possible to follow it during the process.

Industrial Nucleonics Corp. and other manufacturers make the equipment for sealed-source applications of radioisotope measurements. This equipment may be stationary or portable.

There are a great variety of materials that can be used as isotope sources, and a still larger list of tracer radioisotopes. Selection of the most appropriate depends on the conditions of the application, such as compatibility with materials with which the tracer comes in contact, and the length of the isotope's "half-life," as well as economic considerations.

One of the most popular uses of radioisotopes in the oil and petrochemical industries is for the determination of the level of fluids inside containers where floats or similar level indicators would be difficult to apply, either because of the temperature or the nature of the fluid. One such use is the continuous measurement of the level of fluid coke in coke drums. In this operation a froth or foam carries the coke into large settling drums. It is important to know the level of both froth and coke, so that a valve can be opened when the drum is full to divert the coke to a second drum while the first is being cleaned out. As the froth is of low density, some radiation penetrates it and gets to the detector. The coke, on the other hand, is dense and no radiation gets through it. (Diagram, below).

This method is also being used to measure the level of:

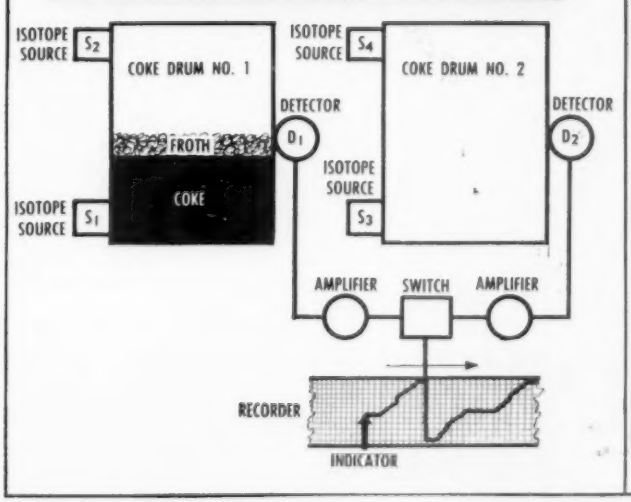
- Acid sludge in the acid reactivator of an HF alkylation plant.
- A liquid or a fluid solid in catalytic cracking installations.
- A mixture of propane and waxy oil in the filter feed tank of propane dewaxing plants, or in the chiller tanks at temperatures down to —55F.

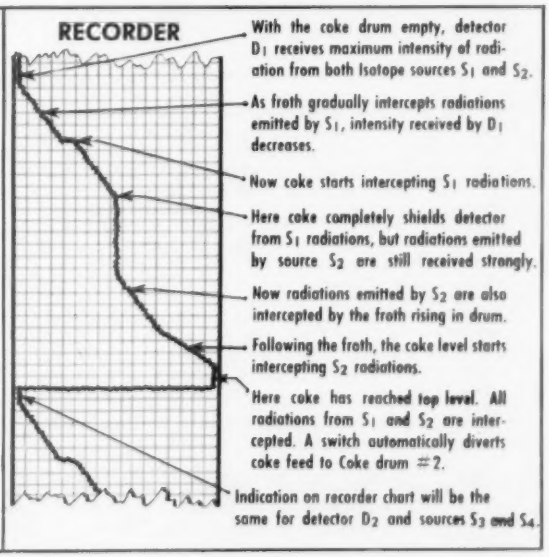
Studies of fractionating tower operation can be made with the help of isotopes.

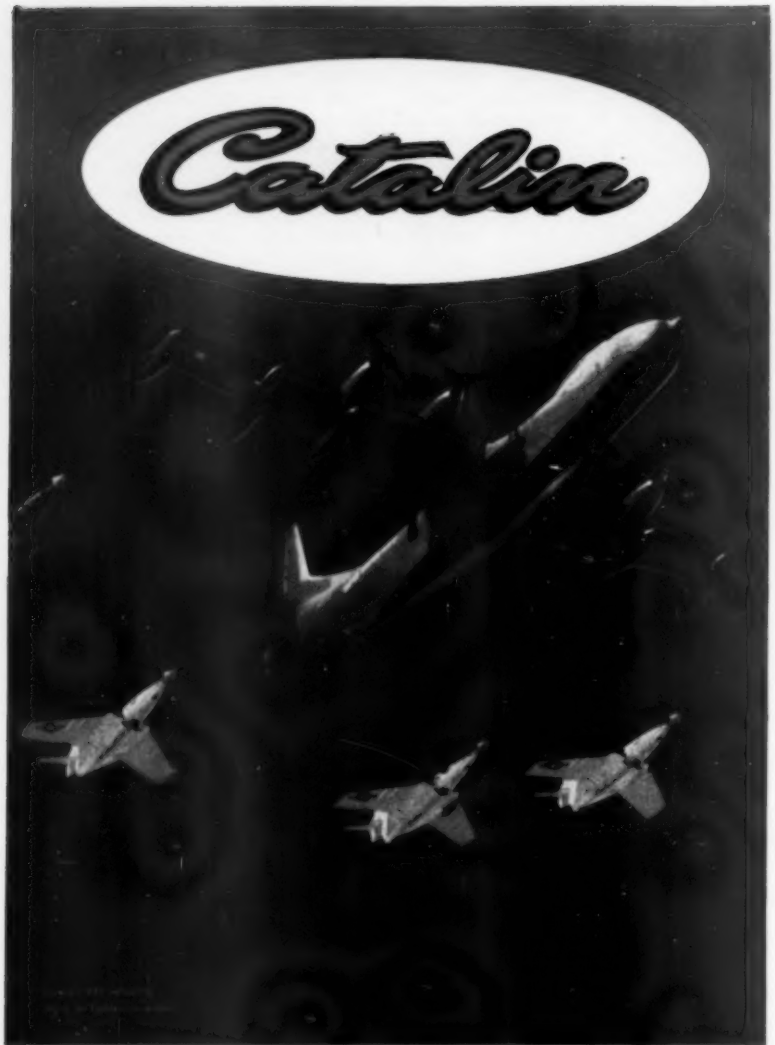
Carter Oil has used this type of inspection to improve the operation of both its crude and its fluid-cat cracking fractionators. Here, a portable isotope in a sealed capsule, and a Geiger counter, are used to locate the liquid levels in the downcomers and across the trays. The apparatus is moved along the outside of the equipment, source on one side and detector on the opposite side, until the presence of the liquid is noticed by a sharp drop in radiation intensity.

A picture of tray performance and

How Fluid Coke Level Is Monitored by a Radioisotope Level Gauge System




RECORDER
With the coke drum empty, detector D1 receives maximum intensity of radiation from both Isotope sources S1 and S2.
As froth gradually intercepts radiations emitted by S1, intensity received by D1 decreases.
Now coke starts intercepting S1 radiations.
Here coke completely shields detector from S1 radiations, but radiations emitted by source S2 are still received strongly.
Now radiations emitted by S2 are also intercepted by the froth rising in drum.
Following the froth, the coke level starts intercepting S2 radiations.
Here coke has reached top level. All radiations from S1 and S2 are intercepted. A switch automatically diverts coke feed to Coke drum #2.
Indication on recorder chart will be the same for detector D2 and sources S3 and S4.



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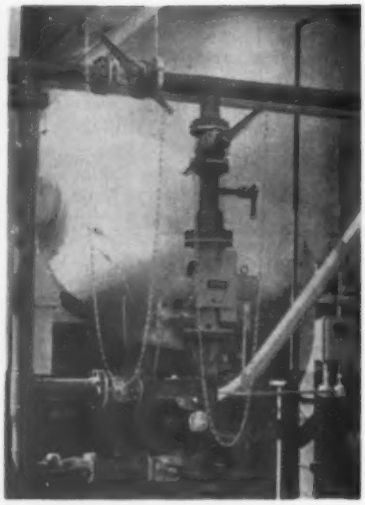


RADIOISOTOPE DENSITY GAUGE made by Industrial Nucleonics Corp. controls percentage of styrene and butadiene in copolymerization unit at Baton Rouge plant of Copolymer Rubber & Chemical.

tower loading can thus be obtained.

The vacuum tower at Billings was also redesigned on the basis of data resulting from this new method.

Another important application of the radioisotope technique is for the determination of the densities of fluids, or the concentrations of solids in suspension.

Changes in densities or concentrations modify proportionately the intensity of the radiation passing through a medium.

The Paulsboro (N.J.) refinery of Socony Mobil Oil Co. has installed an isotope system to maintain constant the concentration of a slurry used for the preparation of its new Durabead catalyst (PW—Jul.10'59,p68).

The same principle of interception of the radiations by a fluid of variable concentration is applied at Copolymer Rubber & Chemical Corp., at Baton Rouge, La., to monitor the percentage of solids carried along in a flow of water, at several points through a chain of reactors. Here, a latex of copolymerized styrene and butadiene is being produced (picture, above). The final concentration is of particular significance.

Goodyear Tire & Rubber Co., in Houston, uses a similar means of control.

This same method is widely used in sulfuric acid alkylation plants, to monitor the strength of the acid. Whenever the density of the recycled acid falls below a predetermined level, this is detected by the isotope control, and fresh acid is automatically admitted to the reactor.

Likewise, the concentration of the "spent acid" can be checked, and maintained at the level required for commercial purposes.

A recent installation uses a radioisotope density-measuring gauge to read the specific gravity of the effluent from a catalyst settler in a unit that makes polyisobutylene. That information enables the operator to optimize the process and thus increase its overall yield.

The use of radioisotopes makes it possible to locate foreign materials in vessels and lines.

Here again, there are two ways in which this can be accomplished. A portable isotope source and a Geiger counter, moved alongside the container, may be sufficient to reveal a "plug" by a sudden break in radiation intensity.

In the other method, a pig in which an appropriate isotope has been incorporated is introduced in the system and the Geiger counter is used to follow its movement, and thus locate the obstruction. Esso Standard Oil Co. uses this method in its Bayonne (N.J.) refinery (pictures, page 76).

Carter Oil cites the case where a catalytic reformer vertical furnace tube was plugged. Since there were no headers in these tubes, they could not be inspected. The plug was quickly located by isotope radiation measurement, a small hole was drilled, the obstruction removed, and, after closing the hole, the reformer was back on stream in a matter of hours.

Ethyl Corp., at Baton Rouge, uses the isotope method to detect lead plugs in internal plant piping.

The use of an isotope tracer, incorporated in a constituent of a process, to label it and thus permit the study of that constituent in the course of the process, has been highly touted, but that technique has not yet been applied much in refineries.

These tests require more planning, safety precautions, and expenses in time and manpower than the other applications, according to the Carter engineers. They add, however, that "It is certain that there are tracer tests which produce results obtainable by no known alternate method."

Use of radioisotopes to measure and control the thickness of a film or an extruded product is now a popular and highly developed method in the petrochemical industry.

This method has not only reduced substantially the percentage of off-specification products, but has made it possible to narrow the margin of tolerance for many processes.

What's New / IN PROCESSING

Furukawa Chemical Industries Co., Tokyo, last week dedicated the world's first commercial plant to use the Standard Oil Co. (Ind.) process for making polyethylene and copolymer plastic.

Furukawa is the first foreign licensee for the process whereby a wide range of plastics can be made in a single plant.

The new plant was designed to make both high-density polyethylene and copolymers. It will have a capacity of 20-million lb. per year when regular commercial operations are under way.

•

Husky Oil Co.'s $8-million project to modernize its Cody (Wyo.) refinery will boost the plant's output to 9,000 b/d.

Expansion, to be completed by late 1960, includes installation of modern catalytic cracking and alkylation units.

•

Institut Francais du Petrole, the French Government's petroleum research institute, has discovered what it claims is the first process for dyeing polyolefins.

The process consists of dipping polyolefin fiber, film, or textile in a chemical reagent for one minute, then rinsing to remove the excess. The polyolefin can then be dyed any basic or acid color.

IFP will not disclose the nature of the chemical reagent used until French patents are approved.

•

Polystyrene and polyvinylidene chloride will be produced in France by the French chemical firm Pechiney and Dow Chemie AG, Dow Chemical's Swiss affiliate.

A joint subsidiary, to be called Plastichimie, will build a plant in Ribecourt, in the north of France, where Pechiney already has a polystyrene plant.

Construction will start later this year, with completion set for 1961.

•

Fluor International S. A. will engineer and construct Australia's first synthetic rubber plant.

Awarding of the contract last week by Australian Synthetic Rubber Co., Ltd., is a major step in the development of the $50-million petrochemicals complex for Australia announced earlier this year (PW—Feb.6'59,p51).

The plant, to be built at Altona, near Melbourne, will produce 30,000 tons of synthetic rubber annually.

Goodyear Tyre & Rubber Co. (Australia), Ltd., joint owner of ASRC, will supply the technical know-how for converting butadine and styrene into rubber.

•

A polyethylene customer service and product development laboratory will be built at Carbide Chemicals Co.'s synthetic organic chemicals and plastics plant at Montreal East, Canada.

The new facilities, to be completed before the end of this year, will assist customers in the processing and promotion of new applications of polyethylene. Further expansion of the laboratory, including a chemical development and pilot plant section, is already being planned.

•

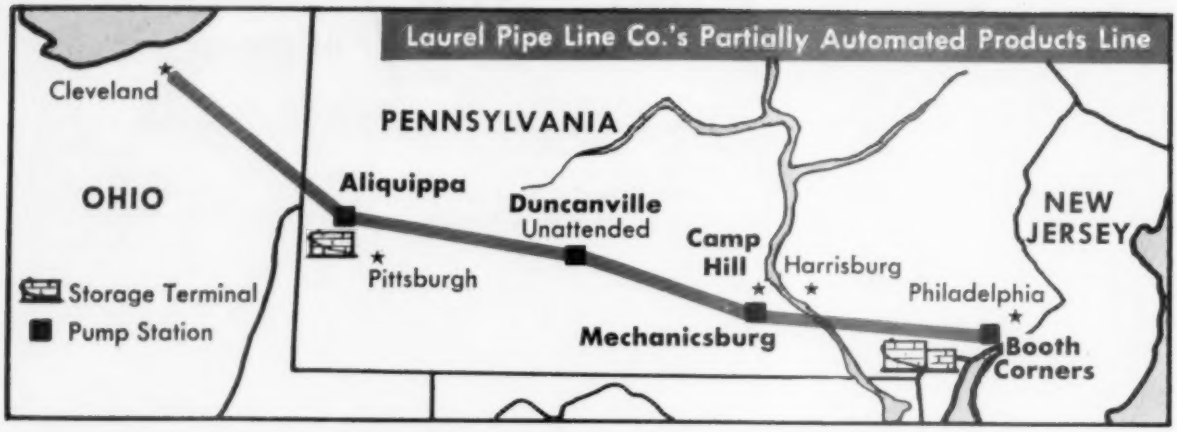
Engineering

A new antiknock additive has just been announced by Ethyl Corp, which says it combines the antiknock qualities of the conventional tetraethyl lead (TEL) and additional qualities of manganese compound. It is called Ethyl Antiknock Compound TEL-Motor 33 Mix.

This additive is the result of research work in the field of organometallics. Ethyl discovered that certain organic compounds of manganese promoted substantially the action of TEL. The new additive is the final combination of TEL with the manganese promoter, which had been labeled AK-33X.

The manganese is present in the proportion of 0.05 grams for each cc. of TEL.

During the past year, 31 refiners here and abroad have tested the new lead-manganese compound. Following 100,000 hours of dynamometer testing, and road testing by Ethyl personnel, over 125-million gal. of treated gasoline were used by the public with satisfactory results, Ethyl says.



Automation Meets Test on Laurel Line

Laurel Pipe Line Co.'s new, automated products line, whose remote-control features have drawn industry-wide attention, has successfully passed a four-month test of heavy-duty operations.

The new system was formally dedicated in a ceremony at Harrisburg, Pa., this week.

The system's remote-control equipment was placed in operation on June 1, and is "in good shape" now, according to a Laurel official.

"We're over the hump as far as construction and installation bugs are concerned," he says. "Now it's simply a matter of making certain adjustments as we go along."

In another sense, the line has been "over the hump" since early March, when it was first put into operation to move products from the Philadelphia refining area over the spine of the Appalachian Mountains to Midwest markets.

Much of the automation equipment has been installed since then.

"Now it's one of the most fully automated systems in the industry," says the official.

Nerve center of the 447-mi. line, which stretches from Philadelphia to Cleveland, is a control station at Camp Hill, Pa., where a high degree of remote control is exercised over the entire system.

Data on operating conditions are continuously transmitted to the station by microwave and over leased wires. These data include flow rate, pump pressures, outbound line pressure, meter readings, and location of products.

The nucleus of the Camp Hill station is a control board, showing a plastic reproduction of the system set off by recording dials and warning lights.

By looking at the map, an operator can tell precisely what is happening at any point along the line, or at any pump station, at that moment.

Moreover, all information relayed to the board is logged by a special, automated typewriter for a station record.

Green lights on the board show normal operating conditions.

Disorders, such as high pump or bearing temperatures and station overcurrent, will automatically shut down a station, and red warning lights will flash on the board. Repairmen can then be dispatched to the seat of trouble.

The main, and perhaps unique, function performed from the central control board is the distribution of 16 different products at 23 different delivery points.

"The most unusual aspect of the system is that every distribution point is remotely controlled," one Laurel official says.

To move a shipment off the line at a certain delivery point, a dispatcher merely throws the switch that corresponds with a valve at that point. When the product has been delivered, a reverse switch is thrown to close the valve.

Colored lights on the board tell the dispatcher whether the valve has responded to his command.

To keep track of shipments, a tape is moved forward under the map and snipped off as batches of products are delivered.

Each inch of tape represents 5,000 bbl., and 1-in. sections are cut off at a time.

As long as the tape remains the same length as the map, the dispatcher knows that all products are accounted for. If the tape becomes shorter, that means a gap in the products column. If it becomes longer, overloading is indicated.

The system's Duncanville (Pa.) pump station, one of four stations on the line, is automatically operated from control headquarters.

The two stations are 100 mi. apart.

A floor plan of Duncanville at the control station shows all operating equipment. Alongside each installation shown on the plan is a pair of lights, one red and one green.

If a piece of equipment should become defective, the red light corresponding to it on the board flashes. When it's operating normally, the green light shines.

Dials also indicate whether the difficulty is mechanical or electrical.

And from the control station, all motors and valves at Duncanville can be shut on or off.

The line's other three stations are manned. "We have no definite plans at this time for more automation," says a Laurel spokesman.

But the company's Mechanicsburg (Pa.) station, just outside Harrisburg, is designed for easy conversion to automation.

This station was built with twice the floor area of Duncanville to permit possible expansion of the system in that area.

If the system is enlarged—for which plans are still only tentative—Mc-

chanicsburg will continue to be manned, because Laurel feels that that would be the most practical way to operate it.

If, however, the system isn't expanded, it's likely that Mechanicsburg, too, will go on automation.

The other two stations—Booth Corners and Aliquippa—will continue to need manpower, because they are situated at Laurel's two storage terminals.

"We'd still have to have men at Booth Corners and Aliquippa to maintain the terminals and handle the storage," a Laurel official says. "We'd need a great deal more equipment to automate them, and we wouldn't save any money by doing it."

Products are delivered from the owners' Philadelphia-area refineries through 24-in. lines to the Booth Corners terminal, near Philadelphia.

Owners of the system are Gulf Oil Corp., 40%; Sinclair Pipe Line Co., 35%; and The Texas Co., 25%.

At present, the owners are the only companies using the line. As a common carrier, however, the line is open to any refinery that wants to use it.

A Laurel official told PETROLEUM WEEK this week that "There's a possibility that other companies may be using the line," but he indicated that it was too early to tell which ones might use it, or when.

The Booth Corners terminal has 17 tanks, with a total capacity of about 2-million bbl.

There, shipments are grouped, scheduled and put into the line.

Aliquippa, near Pittsburgh provides some 1-million bbl. of storage capacity.

There, shipments, after a 300-mi. lift over the Appalachians, are regrouped, and rescheduled for the final push to Cleveland, via Youngstown.

Excessive mixing at interfaces is also handled at that point.

At the line's 23 delivery points, storage terminals have been built, and existing facilities enlarged, to provide storage for 200-million gal.

Gulf has seven new facilities in Pennsylvania, and also at Cleveland; capacity totals 92-million gal.

Sinclair has modernized seven terminals in Pennsylvania, which will store 35-million gal.

Texaco has four new installations in Pennsylvania and two in Ohio to store 27-million gal.

Laurel uses three safeguards to assure that the same quality product that is received in the line is delivered at the takeoff points.

The company employes specially-

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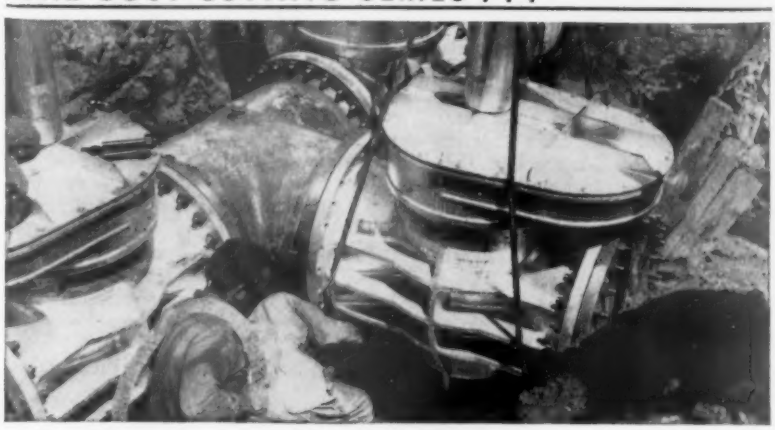

LUBRICATION...helps buried valves stay buried

The down time and labor costs of repairing buried valves can be eliminated by specifying lubricated plug valves (see Rockwell-Nordstrom valves in the photo above). By simply lubricating the valves periodically, metal-to-metal wearing friction is prevented, and fast, easy operation is assured. Also, pressurized lubricant creates a double seal against leakage . . . lubricant is an instantly replaceable soft seat that positively shuts off flow of the lightest gas or the heaviest liquid. Even minor maintenance and repairs are often very costly on buried, non-lubricated valves. Pipeline records prove that lubricating valves is preventive maintenance which cuts down time and labor costs. For complete details on Rockwell-Nordstrom valves and accessories, write:

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developed batch detectors, which trace and pinpoint interfaces by measuring the electrical balance, or dielectric constant, of the line's contents. A change in the dielectric constant means that a different product is passing the detection point.

By tracing the exact progress of a shipment through the line, the dispatcher knows precisely when it has reached its delivery point.

Samples are also sometimes taken from the line to test the detector's accuracy.

In addition, buffers are used to separate products that would contaminate each other. For example, a few hundred barrels of kerosine is used to separate gasoline and heating oil.

Capacity of the line to Mechanicsburg is 240,000 b/d; to Aliquippa, 165,000 b/d.; and from there to Cleveland, 60,000 b/d. Capacity decreases because the line telescopes.

Total input now is about 100,000 b/d.

From Booth Corners to Mechanicsburg, the line's diameter is 24 in.; between Mechanicsburg and Aliquippa, 18 in.; and from there on, 14 in.

A telescoped line was built because the amount of products carried diminishes as shipments are delivered.

Engine Analysis Aids Maintenance

An electronic engine analyzer has proved a valuable tool in the preventive maintenance program of El Paso Natural Gas Co.

El Paso normally schedules major overhauls of its compressor engines for periods of low natural gas demand.

But the company also conducts routine engine checks to spot trouble before a breakdown occurs.

For the past two years, El Paso has used an electronic analyzer, made by Sperry Rand Co., for these day-to-day checks.

As a maintenance aid, the analyzer has proved "highly effective," B. J. Matthews, senior engineer, told the recent Rocky Mountain regional meeting of the Natural Gasoline Assn. of America, at Casper, Wyo.

Three separate engine checks can be made with the analyzer, which is used by El Paso as both a tune-up and a detection instrument.

The instrument was first used primarily for tuneups.

With experience gained in analytic technique, however, the device has been used increasingly to analyze and pinpoint engine difficulties before they become serious.

The analyzer can be used to make ignition checks.

First, a small hole is drilled in the flywheel at the No. 1 cylinder top dead center position. As this hole passes a stationary pulse pickup, a timing mark is flashed on the instrument's oscilloscope screen, registering the engine's timing.

It can be used for vibration checks. These are made by clamping the analyzer's vibration pickup on the engine's cylinder head nut. Vibrations pass through the pickup and register a pattern on the screen.

Engine defects revealed by this check include broken rings, worn valve guides, and leaking valves. The check will also reveal whether the engine is detonating and whether valve timing is correct.

Engine pressure can also be determined with the analyzer, though an absolute measurement can't be taken.

Here, the instrument's reference level comparator is used to balance out peak pressures among the engine's cylinders. Through a pressure pick-up, pressure is registered on a dial. Compression pressures may also be compared by this method.

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NEWS ON TEXACO PROGRESS

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TEXACO

. . . CONSTANT PROGRESS IN OIL'S FIRST CENTURY

What's New / IN PIPELINES

Transcontinental Gas Pipe Line Corp. is pushing its natural gas transmission system farther out into the Louisiana Gulf and deeper into its New York-New Jersey market.

Several newly completed facilities, all soon to be in operation, will greatly increase Transco's deliveries of offshore gas to the metropolitan markets. They are:

- A 139-mi. network of gathering lines off the Louisiana coast.
- A new, 193-mi. pipeline from Transco's Leidy (Pa.) storage field to New York City.
- Newly developed underground storage wells at Leidy.

Transco says the new facilities will boost the system's delivery capacity to 1,647,000,000 cf/d.

•

A newly released report on Alberta's LPG industry has cast doubt on plans of some Canadian companies to widen domestic markets and win new ones in the U.S.

Canadian Hydrocarbons, Ltd., has shelved its plan for an LPG pipeline to eastern Canada, according to the report, published by the Research Council of Alberta.

And while the report doesn't directly mention plans of Foothill Products Pipe Line, Ltd., formed to build a line to the Pacific Northwest (PW —Nov.28'58,p9), it says that "high construction costs make a pipeline over the Rockies unfeasible."

•

Standard Oil Co. (Ind.) will build a terminal on the Missouri River, near Jefferson City, Mo., to store and distribute products from its Wood River (Ill.) refinery.

Facilities will include a barge unloading dock, four storage tanks with a total capacity of 142,000 bbl., and a truck loading ramp.

•

Colorado Interstate Gas Co. has asked Federal Power Commission approval to reduce its natural gas rates by $4.5-million annually.

If the cut is granted, Colorado Interstate plans to make refunds back to Feb. 4, 1958.

An Oct. 20 hearing has been called by FPC on customers' claims that rates are too high. The requested reduction might provide a basis for a settlement.

Nitrous Oxide Traces Leaks

Nitrous oxide, even in very small quantities, has been found by the Southwest Research Institute to be an excellent tracer for detecting leaks in gas pipelines.

Laboratory and field tests, in which nitrous oxide in water solution was injected into pipelines, have shown that the gas is readily detectable at ground level by an infrared analyzer.

It was found that a quantity of gas as small as 0.007 lb. released in the line over the period of an hour can be detected.

The tests were conducted by the institute for Ohio Chemical & Surgical Equipment Co., Murray Hill, N. J.

SwRI believes that the use of nitrous oxide would be a faster and cheaper detection method than standard hydrostatic testing, the cost of which is about $1,000 a day.

Nitrous oxide gas is fairly cheap, and the nitrous oxide solution can be reused, the institute reports.

Other advantages are claimed for the use of nitrous oxide.

- It's not toxic, corrosive, irritating to humans, or explosive.
- It's stable.
- Since it's a man-made substance, it will be discovered only in areas where it has been deliberately liberated.

A market survey indicates "considerable interest in the technique among companies in pipeline construction, local gas distribution, and interstate pipeline shipment," according to SwRI.

Another possible application suggested by the institute is in the discovery of leaks in storage tanks.

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When installed on an oversize barrel (slightly larger than the o.d. of the pig), it's easy to get a pig in and out of the trap. Line pressure does the heavy work.

These simple, convenient closures are equally desirable for gas line blow-off heads (see above), strainers, product line terminal manifolds, or any other service where pressure vessels must be opened for inspection, cleaning, repairing, connecting to a line, etc.

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DEPT/International

U.S. Majors Plan Drilling in Italy

Pan Am and Cities Service want protective acreage before they spud their first exploratory test.

Two U.S. firms—Pan American and Cities Service—may be the first major foreign companies to drill in mainland Italy since passage of a stiff oil law in late 1956.

They are, in fact the only major foreign oil companies now holding acreage on the mainland. Gulf, which had found oil in eastern Italy, pulled out entirely after passage of the law and is now concentrating on Sicily. That island is semi-autonomous and has a more liberal oil law, which encourages foreign capital, and which does not grant built-in preferential rights to Italy's state-owned ENI group.

Cities Service, operator for itself and Pan Am, has now drawn up a drilling program for seven mainland tests.

The first wildcat is slated for a location some 55 mi. west of Bari, in southeastern Italy (map). Three other locations have been definitely selected, and three more tentatively.

The initial site is 120 mi. southeast of the Abruzzi finds originally made by Gulf, and 60 mi. northwest of a recent gas discovery by ENI.

But first, the companies are seeking protective acreage in areas surrounding their present permits. Applications have been filed for 13 blocks comprising 766,000 acres in southeastern Italy.

The present permits cover some 923,400 acres in 14 blocks stretching 250 mi. from the heel of Italy's boot to near the city of Foggia. They are held by three firms known as Rima, Minia, and Sitar.

They were originally formed by the Conorada group with Cities Service participating.

After passage of the oil law Conorada withdrew, and Pan American subsequently joined Cities Service as a partner for the proposed exploration. Adriatic Petroleum, a Cities Service subsidiary, is the operating company.

The companies hope to gain acreage in the open corridors between their various tracts to be sure that they will have the rights to the entire structure to be tested. For example, the companies are seeking the acreage between their blocks 5 & 7, which are separated by some 5 mi., and the acreage between block 7 and the eastern limit of the disturbed belt.

A decision by the government is expected very soon. The Technical Committee on Hydrocarbons met this week with the Minister of Industry & Trade to consider the applications.

Trend: More Shares for Nationals

A new trend is taking shape in foreign refining projects of major oil companies: Offers of voting stock to local investors in the Far East and Australasia.

This means sharing of management—as well as investments and profits—a highly controversial issue. And the pattern is emerging in an area where there is neither an established pool of experienced oil management, nor an abundance of available capital. The reason: political atmosphere.

So far, the offers have been made only in newly projected refining ventures, for example:

- In Pakistan: 40% local, 60% to be shared by Stanvac, Caltex, Shell, and Burmah Oil in a $31-million 30,000-40,000 b/d refinery.
- In New Zealand: 40% local, 60% Shell, for a $47.6-million 40,000 b/d plant.
- In the Philippines: 25% local, 75% Shell, for a $19-million, 25,000 b/d refinery.
- Also in the Philippines: 75% local, 25% Gulf Oil (which has no refining interests in the area) for a $30-million company that will build a 10,000-17,000 b/d plant.

Voting stock in some existing operations may also be offered locally. In Bombay, for example, there have been reports that such shares would soon be offered in the Burmah-Shell and Stanvac refineries. A Shell spokesman in London last week guardedly confirmed this as a "possibility," while in New York Stanvac would say only that "no offer has been made."

Shell says it doesn't have a "policy" on local equity stock, but concedes a trend in that direction.

Each project, whether new or existing, is considered separately, the London spokesman said. Decisions are based on such factors as "attitude" of the local government, amount of available local capital, and the economics of taking in outside participants.

Stanvac says it is looking into the issue "everywhere," though it's uncommitted on its solo ventures in the Philippines and Australia.

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Venezuela's Outline for New Policy?

CARACAS—What appears to be an outline—or a trial balloon—for a new government oil policy with far-reaching implications for the industry was issued here last week.

It's in the form of a "Petroleum Policy" statement adopted at the national convention of the Venezuelan government's Accion Democratica party. For Wanda Jablonski's comments on it from Caracas, see page 16.

Following is a translation of the full text of the statement as published in El Nacional, Caracas newspaper:

⏩ At the time the constitutional regime came to power, there were two fundamental problems which needed solution in order to safeguard our petroleum wealth, key for all Venezuelan economic development.

Price & Market Controls

⏩ Price reductions were threatening the government's income, which had already been affected by various factors during 1958. If an unchallenged price reduction was allowed, it would have rendered ineffective the tax increase of year-end 1958, and an economic crisis would have been the unavoidable result.

⏩ The policy followed by the Ministry of Mines was efficient and realistic.

In the first place, the oil companies were notified that the government was not going to allow any reductions in price made by the companies against the national interest. This in itself, however, could not assure success in this area.

It was necessary to act internationally. For this purpose, the logical path led to an understanding with the Arab countries.

The possibility of a strong fight for markets, which would become more intense as surplus capacity was increasing, dictated for a unified petroleum policy with the Middle East.

⏩ The Cairo Petroleum Congress was a clear triumph for Venezuelan efforts to avoid a price war.

Petroleum experts are all in agreement in forecasting future crude oil demand growth at least as great as in the past. Consequently, no insurmountable difficulties are contemplated in negotiating with the Arabs in order to divide the markets, set a common price policy, reopen tax rates, and even simultaneously create national oil companies. These negotiations are planned to be carried out by means of conferences between Venezuela and the Middle East.

U.S. Import Quotas

⏩ The U.S. import restrictions have been handled by the constitutional government with the special tactical ability required.

The thesis of our fellow party-member Perez Alfonzo, presented in Washington, is based on the principle that restrictions should be regulated by the state through diplomatic agreements.

This principle is not only more beneficial to the nation, but also represents the most useful tool in the strategy against petroleum imperialism.

⏩ To be able to negotiate our petroleum exports by means of treaties fixing quotas—modifiable only through bilateral discussions—means to snatch from imperialism its so-far exclusive prerogative of establishing volumes and terms.

This opens a new era of intervention by the smaller countries into an area so far closed to them. Perez Alfonzo's thesis has been put forward at an opportune time because the U.S. cannot, just like that, close the door to Venezuelan petroleum exports, inasmuch as its increasing demand is not backed by adequate reserves.

National Oil Company

⏩ The national oil company has not been created yet, but there is one strong reason justifying our caution in this matter. Venezuelan experience has demonstrated that state enterprises created in haste become economic burdens for the people.

It was preferable in this case to study all the problems connected with the formation of such an oil company, including the sending abroad of observers to study the operation of similar enterprises in other countries. On this subject, original sins are difficult to correct thereafter, and a few months of preparatory work could well save years of difficulties.

The time has come now to define certain questions such as the type of capital to be used. In our opinion, the national oil company should have state capital only, because Venezuelan private enterprise neither participates in corporations in which the state has majority, nor invests in ventures which do not return juicy profits.

The company's program in such areas as exploration, development, capital investment, marketing, and technical assistance should be established beforehand by means of careful studies.

⏩ In this connection, it is worthwhile to suggest that the national oil company take over and develop on a commercial scale the limited petroleum refining now being done by Petroquimica, with the aim of eventually supplying the local petroleum market.

This is recommended because the oil companies would be bringing fewer dollars into the country to cover their local expenses as the local market grows. Our foreign exchange requirements are so great that we should avail ourselves of this opportunity to increase the dollar inflow, especially for the future, in case the oil markets should deteriorate.

At the present time, Venezuela pays dollars for the oil it consumes—as if it were importing it—since the oil companies, by their participation in

Unitization to Aid National Oil Company

CARACAS—Unitization, says Oil Minister Juan Perez Alfonzo, will solve the problem of marketing oil produced by Venezuela's proposed national oil company from extensions of present producing reservoirs.

The Venezuelan Petroleum Corp., which is expected to be set up by year's end, will get into business by drilling offsets to present producing fields.

"We know there are areas of Venezuela where reservoirs extend across concession boundaries," Perez said last week.

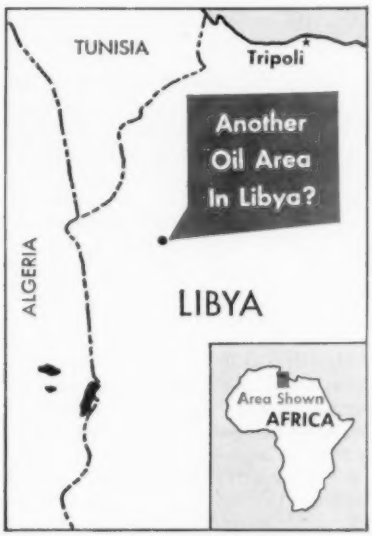
"In this case there will be no marketing problem, because oil will be produced proportionately through unitization."

The Venezuelan government has been pushing company unitization agreements in recent months. Under standard unitization procedures, if one member of the unit is unable to market its crude, other members must either purchase the crude or cut back their own production proportionately.

The Minister again emphasized that Venezuelan Petroleum Corp. will start on a small scale—and proceed "step by step."

the local market, bring fewer dollars into the country.

⏩ Such a situation can only be solved by granting the national oil company a monopoly to supply the local product market once its refining capacity is adequate to cover local demand.



Oasis Encouraged By West Libya Find

Oasis Oil is drilling ahead in its western Libya wildcat after a substantial show of oil. The test is now below 6,472 ft. and operator is coring in a shale section of undetermined age.

The A-1-26 test, 250 mi. southwest of Tripoli, flowed 40-gravity oil with a high gas-oil ratio to the surface in 20 minutes from 5,719-40 ft. On a prior drillstem test at 5,699-720 ft., 37-gravity oil rose 2,570 ft. in 90 minutes. The 40-ft. pay section is a lower Carboniferous sand.

The small thickness of pay may seem disappointing, but the rate of flow and the size of the structure are very encouraging. Although the exact size of the structure has not been determined, it appears comparable to others in western Libya which are 20 to 40 mi. long, according to geologists on the scene.

The rate of flow indicates a high permeability. This is in line with production in the Edjele field, nearby in the Algerian Sahara, also from a permeable Carboniferous sand.

The test has yet to enter the Devonian and Silurian, producing horizons at Tiguentourine and Zarzaitine, across the Algerian border.

Oasis Oil also has oil and gas discoveries in central Libya's Sirte basin.

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What's New / AROUND THE WORLD

French-Spanish Swap On Sahara Rights?

SPAIN—The French group that filed for eight Spanish Sahara blocks with Spain's INI is expected to file a better bid that includes an offer of French Sahara rights in exchange.

The group, set up as S. A. Estudios y Exploraciones Petroliferas, includes: Eurafrep, 43%; Francarep, 24%; and the government-controlled Safrep, 33%.

While exact terms were still being thrashed out early this week, Paris sources indicated part of the offer may be an interest for INI in Safrep's 2,658-sq. mi. Tindouf permit in the western French Sahara. This adjoins two of the Spanish blocks filed for earlier (PW—Sep.11'59p46).

•

BOLIVIA—The government, which was recently offered a $60-million Soviet loan for its state oil company, is asking the U.S. to "take a second look" at its policy against loans for oil development.

The fact that Bolivia is also open to private oil capital was emphasized in Washington last week by Foreign Minister Victor Andrade, who estimated that the state oil company could use $50-million to $100-million.

•

SPAIN—An eight-man government commission was set up last week to rule on oil company investment plans for the Spanish Sahara and Guinea.

The unit, headed by Jose Villetas Bustamente, is empowered to judge and approve financial aspects of projected exploration ventures in the African territories.

•

CZECHOSLOVAKIA — Construction has been started on a Czech section of the 2,500-mi. Soviet-East Germany crude oil line. Prague newspapers report that the state construction agency is undertaking the 250-mi. stretch between Bratislava, where a refinery is under construction, and Kralovice, southwest of Prague (PW—Jul.10'59,p76).

•

JAPAN—Due to expanding industrial demand, the government last week hiked Japan's oil import budget by $25-million for the second half of the fiscal year ending next March. The total foreign exchange allocation for oil was set at $116,117,000, including $142,325,000 for crude.

•

ARGENTINA—The U.S. group building Argentina's twin northern pipelines last week completed its 568-mi. stretch of the 12¾-in. crude oil line from Campo Duran to San Lorenzo. The section, from Tucuman to the San Lorenzo refinery, forms part of a 922-mi. outlet for northern production. Participants in the group are North American Utility & Construction Co., Fish North West Constructors, and Rivers Construction Co.

INDIA—New Delhi has apparently settled for Moscow's terms for aid in building its projected Barauni refinery. According to Radio Moscow, a pact signed last week provides for a long-term Soviet grant of 100-million rubles for a 40,000 b/d plant —terms which India had considered inadequate for a "first-class" refinery.

•

WEST GERMANY—The first delivery of French Sahara crude to West Germany marked official opening of a new oil harbor that serves the 30,000 b/d Heide refinery of Deutsche Erdoel, German independent. The cargo arrived at Brunsbuettelkoog last week in the 12,000-ton British tanker Tynefield.

•

UNITED KINGDOM—U.S. Industries, Inc., is taking over a British manufacturing company that will now concentrate on the North African oil equipment market.

The company, acquired for "several million dollars," is Burtonwood Engineering Co., manufacturer of oil well equipment, oil seals, and precision machinery for the plastics industry.

•

WEST GERMANY—Coal hydrogenation plants will lose their present $33-million exemption from oil taxes under a proposal drafted for Parliament action by the Economics and Finance Ministries. Decreasing subsidies are substituted for four years. After that, no benefits will be granted to noneconomic installations.

•

BOLIVIA—Atlantic Refining has taken a second farmout in central

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Bolivia—this time on a 235,000-acre Zone I concession held by White Eagle International Oil and its partners. Atlantic gets an option to drill a test to 10,000 ft. or the Devonian by July, 1961, to earn an 80% working interest. The tract adjoins acreage on which Atlantic has a similar pact with Bolivian Petroleum, a Drilling & Exploration Co. subsidiary (PW—Jan. 16'59,p68).

•

VENEZUELA—Bolivia has agreed to buy $1.5-million of Venezuelan fuel oil and other refined products in return for Venezuelan purchases of $2-million of metals. The agreement was signed with Bolivian Mining Corp. by a Venezuelan government bank, which will pay $1-million immediately and the other $1-million within six months.

•

Oil Center Tool Co., of Houston, is stepping up its overseas sales program. It expects to be covering "all parts of the free world" under agreements to be completed with 20 different agents by the end of this year, according to president Al Wolff. At present, its wellhead equipment is manufactured in England and Mexico under license.

•

INDIA—Iraq is apparently aiming to line up India as an outlet for its planned export of refined products (PW—Sep.25'59,p24). An Iraqi trade delegation was recently in New Delhi to negotiate for imports of Indian goods in exchange for Iraqi-refined products.

•

SICILY—Gulf Italia is making its first deliveries of Ragusa crude to a new petrochemical plant near Syracuse. It was recently completed at Priolo for production of ammonia by Edison, a private Italian petrochemical complex.

•

Wildcats in the News

GUATEMALA—Ohio Oil has sidetracked its No. 1 Chinaja after an unsuccessful fishing job. The test, which reached 10,607 ft., was whipstocked and is now being drilled below 6,760 ft. Several thousand feet of junk were left in the hole, which found Guatemala's first promising show of oil at 10,005-36 ft.

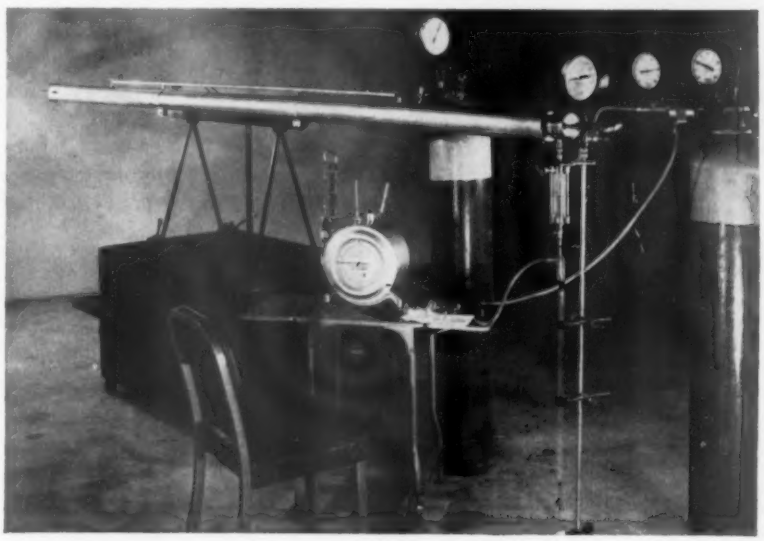
PHILIPPINES—Stanvac has abandoned its latest Cagayan Valley wildcat in Luzon. No. 4 Ipil was bottomed at 6,294 ft. without any shows. The contract rig will now be used by Caltex, and returned to Stanvac acreage next spring.

The Caltex group will use the rig on a 7,500-ft. test in the northwest part of Luzon's Cagayan Valley as the first on its own acreage. The site is 50 mi. northwest of Tumauini, where a 10,414-ft. dry hole was drilled by Philippine Oil Development Co. in 1956 with Caltex participating 50%.

LIBYA—Amoseas has spudded No. 2 Beda 5 mi. north of its first successful wildcat in the Sirte basin. The No. 1 Beda was acidized and completed through tubing for 3,650 b/d of 36.6-gravity oil. The well, whose total depth was 5,107 ft. was plugged back to 4,110 ft.

ISRAEL—Naptha Israel Petroleum Co. will drill the Kidod structure, 3 mi. north of Zohar, a small gas area 15 mi. from the Dead Sea.

SICILY—The second offshore extension of the Gela field is being carried to 12,500 ft. after finding oil at 10,240 ft. (PW—Oct.2'59,p36). Italy's state-owned Agip Mineraria plans to drill its third offshore test 2.2 mi. south.



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DEPT/Personals

LEWIS M. THOMPSON, with Cosden Petroleum Corp. since 1953, has been elected vice-president in charge of the production department, and **Lowell E. Ullery,** vice-president of Chase Manhattan Bank, New York, has been elected a director. Thompson has been manager of the production department, with offices at Cosden's headquarters in Big Spring, Tex.

L. M. Thompson

J. S. Sprowls

JOHN S. SPROWLS has joined Vickers Petroleum Co., Wichita, Kan., as vice-president and assistant to the president. Sprowls was formerly assistant treasurer of Gulf Oil Corp. in charge of loans and related investments. In his new position he will be responsible for investments and long-range financing programs, and will assist the president on special assignments and projects.

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J. P. Murphy, General Manager, Denver

HAROLD GEIS will act as temporary president of Pano Tech Exploration Corp., Houston, pending the selection of a new president. **L. Thain Leonard,** who has been president, has resigned from that position, but continues as a Pano Tech director. Geis is also a director of the company.

DON L. HALL, geologist, has joined the staff of H. J. Gruy & Associates, Inc., Dallas. He was formerly in the geological departments of Sinclair Oil & Gas Co. and Hill & Hill, oil operators.

HENRY M. HANBURY has been appointed general manager of the foreign operations department, Western Hemisphere and West Africa, for Texaco Inc., in New York. He succeeds **Landon B. Derby,** who was recently elected vice-president in charge of that department. Hanbury, with Texaco since 1928, has been manager of the foreign sales division, in New York, since 1957.

H. M. Hanbury

R. A. Eeds

ROBERT A. EEDS has been elected president and a director of Esso Standard (Libya), Inc., succeeding **James A. Clark,** who is retiring. **H. W. Brown,** who has been an Esso Libya vice-president and director, in Tripoli, since early this year, was elected to the newly created position of executive vice-president. Prior to his new appointment, Eeds was vice-president and a director of Arabian American Oil Co., in Dhahran, Saudi Arabia. He will be located at Esso Libya's executive offices, which have recently been moved from New York to Tripoli.

ROBERT R. JENKINS has been promoted to assistant marketing manager of Continental Oil Co.'s Southwestern region, at Ft. Worth. He succeeds **Dean Hadfield,** who recently became marketing manager for that region. Jenkins was formerly district marketing manager for Conoco in Minneapolis. At the same time, **John W. McCulley** was promoted to manager of the company's Houston marketing division. He was formerly marketing operations manager for the Rocky Mountain region at Denver.

FRED A. ESCHERICH, senior market analyst in Mobil Oil Co.'s petroleum chemicals department in New York, is the new president of the Chemical Industry Assn. **Richard S. Mooney,** Continental Oil Co., was elected general counsel of CIA. The association is an organization of chemical executives involved in sales, production, market research, purchasing, market development, advertising, finance and research.

J. C. McCarthy

A. R. Winzeler

ALVIN R. WINZELER is the new division exploration superintendent, and **J. C. McCARTHY** is the new assistant division production superintendent, of Pan American Petroleum Corp.'s Texas-Louisiana Gulf Coast division, in Houston. Winzeler succeeds **J. C. Johnston,** who has been transferred to Tulsa as manager of exploration. Winzeler was formerly Pan Am's Canadian division exploration superintendent, with offices in Calgary. McCarthy succeeds **George C. Wight,** who has joined Pan Am's foreign subsidiary, Pan American International Oil Co., in New York. McCarthy was formerly located in Casper, Wyo., where he was assistant production superintendent of the Rocky Mountain division. **C. A. Brooke, Jr.,** replaces **R. S. Tremaine** as division geologist for the Texas-Louisiana Gulf Coast division. Tremaine recently became Pan Am's geological research director at the research center in Tulsa. Brooke has been district exploration superintendent in New Orleans since 1957.

H. Jeffries

I. J. Bergholt

HARRY JEFFRIES has been elected to the newly created position of chairman of Sinclair Oil Corp.'s finance committee, and **IVER J. BERGHOLT** has been elected treasurer. Jeffries is also executive vice-president and a director of Sinclair. Bergholt, vice-president and assistant treasurer since 1955, succeeds **W. F. Dau,** who is retiring. Two Sinclair directors serving on the finance committee with Jeffries are **Robert L. Clarkson,** chairman of American Express Co., and **William Gage Brady, Jr.,** chairman of Enka Corp. Other committee members are Bergholt, vice-president and treasurer, and **O. P. Thomas** and **C. J. Allen,** vice-presidents.

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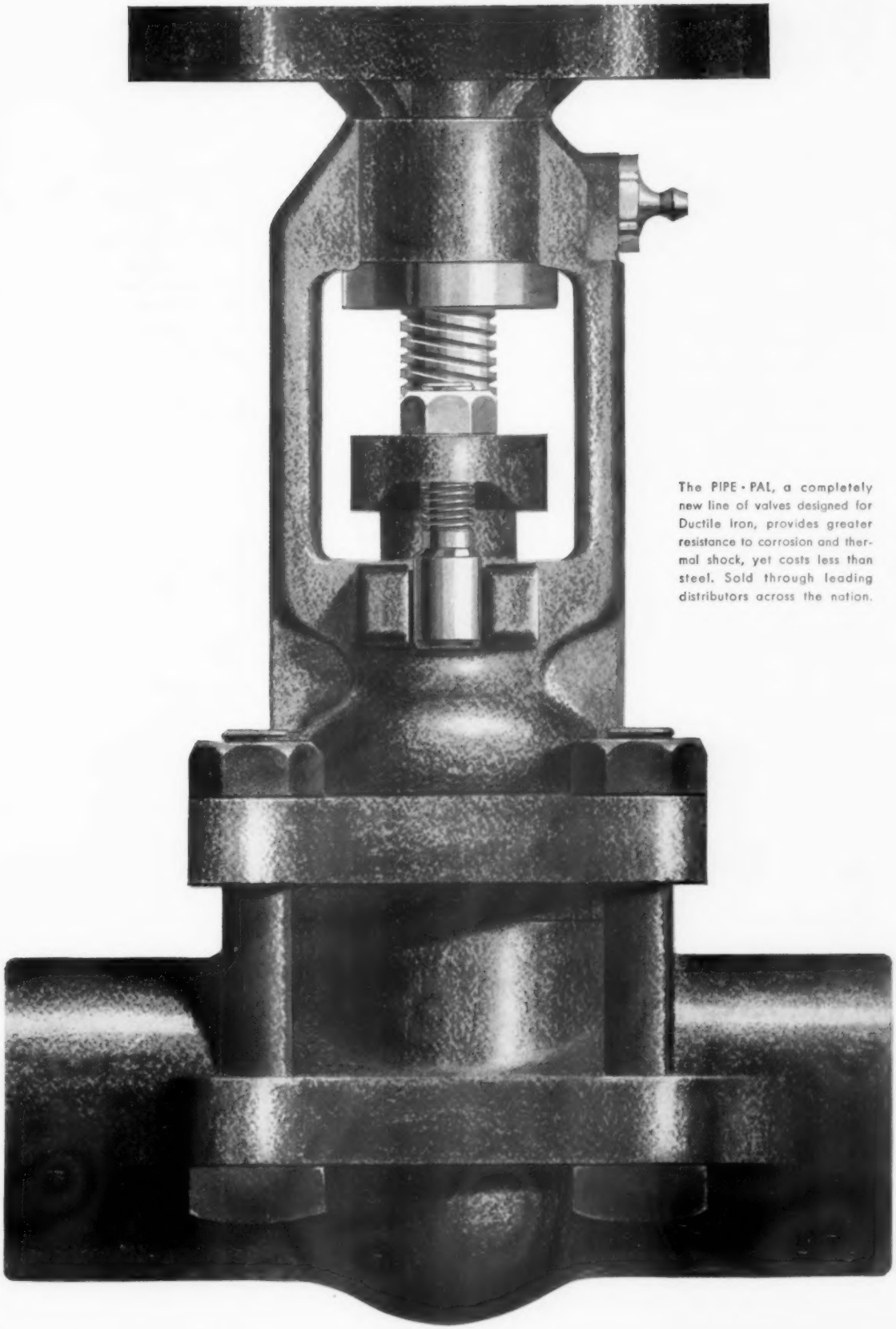

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A good, responsible production manager has to keep informed, and that's why he likes Petroleum Week—oil's most readable magazine. He is a middle management man in charge of drilling and producing operations. His main job is to develop a budget and oversee the expenditures approved by top management—and he takes more than a passing interest in important tools of his trade. Production managers are among the many thousands of subscribers to PW who are actively and directly engaged in the producing segment of the oil industry.

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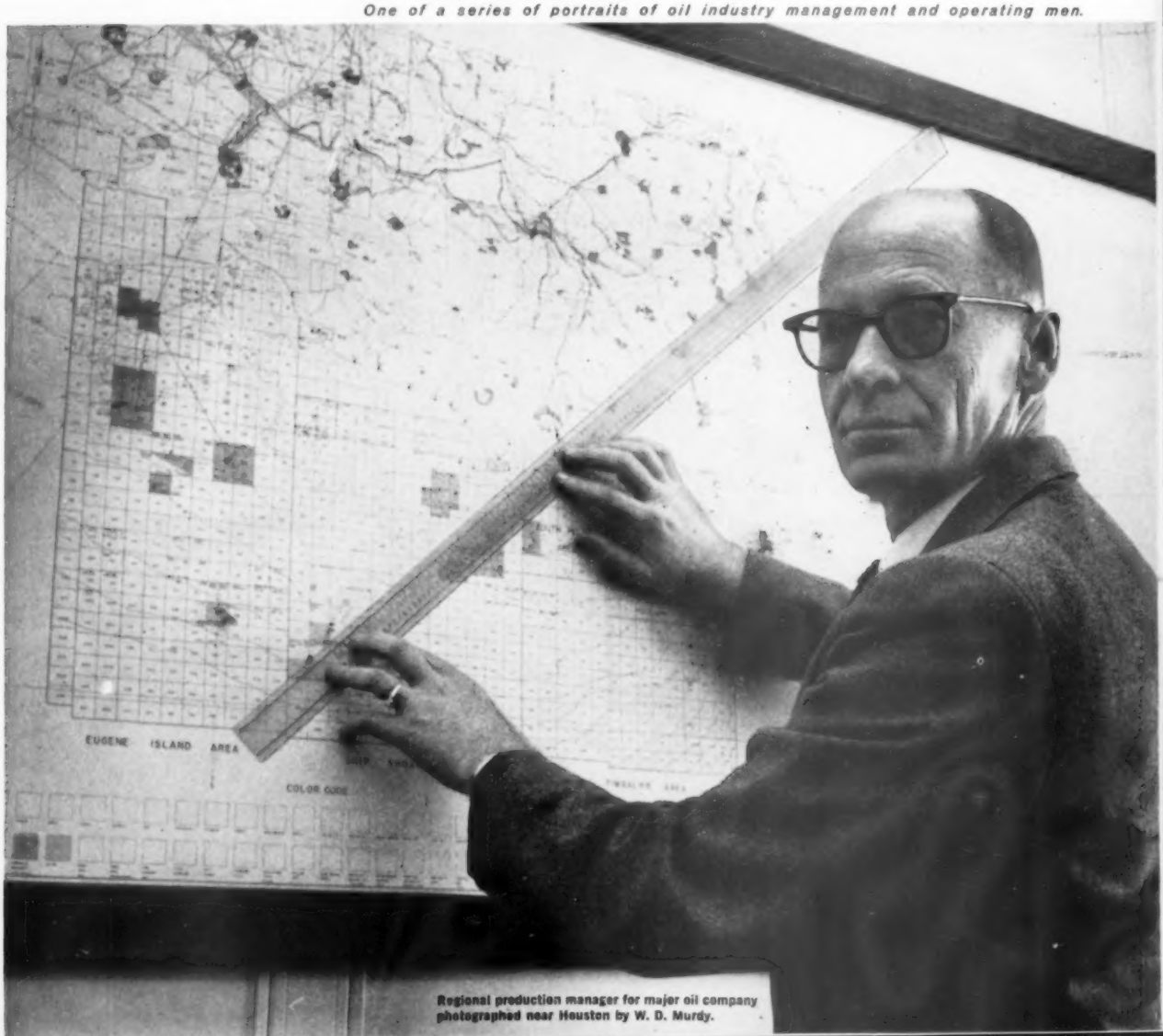
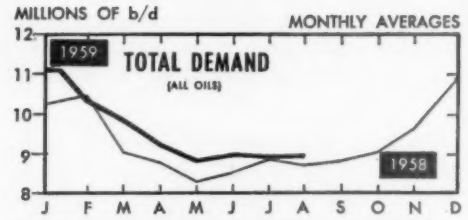
One of a series of portraits of oil industry management and operating men.

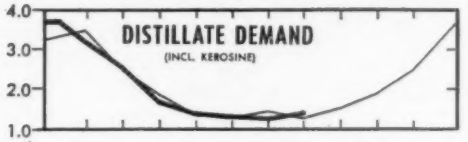


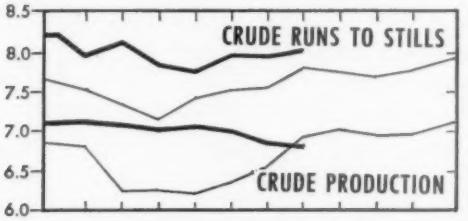
Regional production manager for major oil company photographed near Houston by W. D. Murdy.

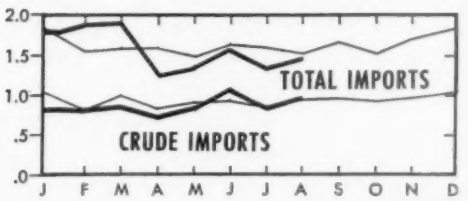
PETROLEUM WEEK'S

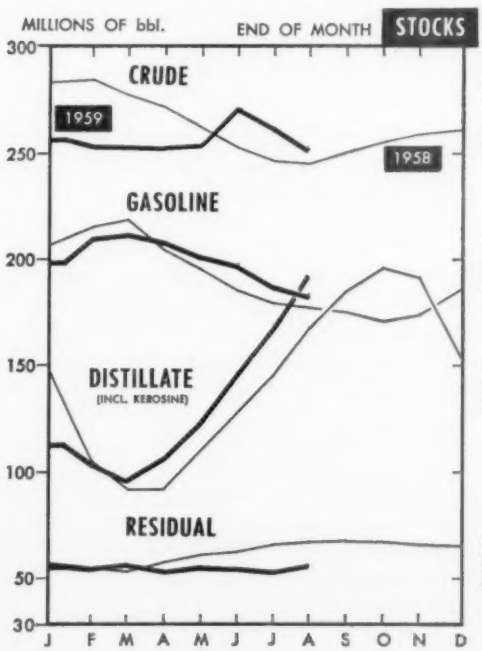
Fingertip Figures











Supply-Demand Figures for September

(millions of b/d)

	September 1959	% Change from year ago	9 Months 1959	% Change from year ago
Total Demand (Inc. Exports)	9.213	+4.6	9.560	+ 5.4
Gasoline	4.447	+8.5	4.171	+ 5.2
Distillates (Inc. Kerosine)	1.657	+8.7	2.039	+ 2.5
Residual	1.309	—1.4	1.596	+11.1
Total Supply	9.196	—3.7	9.684	+ 7.7
Domestic Crude	6.818	—4.0	7.063	+ 7.0
Nat. Gas Liquids	.800	.....	.853	+ 9.1
Total Domestic	7.618	—3.6	7.916	+ 7.2
Crude Imports	1.023	+2.6	.961	+ 2.2

Figures for period ended October 2, except as noted

RUNS TO STILLS

Latest week	7.618
Previous week	7.722
Year ago	7.507

CRUDE PRODUCTION

Latest week	6.825
Previous week	6.858
Year ago	7.014

TOTAL IMPORTS

Latest week	1.961
Previous week	1.653
Year ago	1.721

CRUDE IMPORTS

Latest week	1.404
Previous week	.939
Year ago	1.020

CRUDE STOCKS

Week ended 9-26	250.3
Previous week	250.2
Year ago	250.3

GASOLINE

Latest week	175.9
Previous week	180.9
Year ago	172.5

DISTILLATES

Latest week	206.4
Previous week	204.6
Year ago	187.8

RESIDUAL

Latest week	59.5
Previous week	59.4
Year ago	68.7

Total demand for gasoline in September set a new monthly record of 4,447,000 b/d as refiners moved motor fuel out of primary storage to beat the Oct. 1 increase in federal taxes.

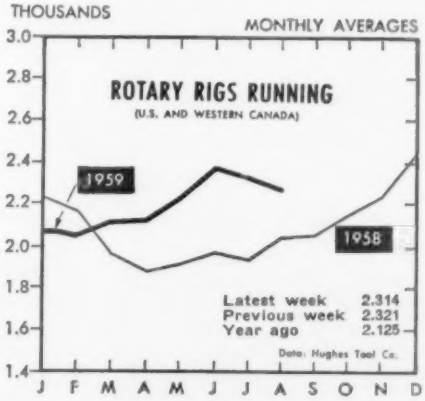
During the last week of the month, gasoline demand—or in this case, movement—hit 5-million b/d.

The result was that gasoline stocks declined by 6-million bbl. in September, a much-needed inventory reduction.

Stocks at the end of the month of 175.8-million bbl. were only 3.3-million bbl. above a year earlier, the closest that motor fuel inventories have been to the so-called "desirable" level in more than two years.

Whether September's gasoline movement constitutes a "correction" in the oversupply is doubtful.

Most experts believe it was a case of borrowing from Peter to pay Paul, since the large movement from primary storage did not represent consumption—but a switch in storage position.



The Market Trend

AT-A-GLANCE
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PETROLEUM WEEK

The Seasonal Price Rise Comes Hard

Seasonal price advances on distillates are having a tough time getting off the ground. True, Gulf prices have moved up 0.375¢ a gal. from a five-year low point, but listings in large consuming areas, especially the East, show little improvement. Summer fill programs expired last month in the East, but discounts of 0.5¢ a gal. remained intact. In the Midwest, price shading still is in evidence.

Price comebacks for distillates have been tough in recent years because of wide variations in quotations. In early 1957, the period of the post-Suez U. S. crude price hike, No. 2 barge prices at New York boiled up to a record 11.65¢ a gal. From that point they dropped steadily, reaching a low of 8.85¢ in April, 1958. Prices went up last winter, and sellers considered themselves lucky to recoup a little more than 2¢ of the 2.8¢-a-gal. decline. But again, the following downswing brought prices down to 8.85¢ a gal.

Prices are sure to strengthen this season, but the total increase is not expected to hit 2¢ a gal. Guessing ranges from a conservative 0.75¢ to an optimistic 1.5¢, barring any international crisis. Even with a 1.5¢ hike, listings in the East still would be more than 1¢ below those in effect in early 1957, with no substantial change in East Texas crude prices.

Recent absorption of many East Coast independents by majors, and other reorganizational upheavals in the industry, are likely to play a part. With slimmed-down cost factors, these reorganized companies may play it cautious this winter. With one eye on import controls and the other on inroads from natural gas, they may be slow to hike prices, tend to emphasize stocks on hand. Gallonage gains and public relations will mean as much, or more, than price comparisons with previous years.

Resid Surprise:

Spot cargo prices for low-sulfur residual fuel have surprised everyone. It is normal for this product to ease in the summer and to command no higher price in the spot market than that for ordinary bunker "C" fuel. But instead of slumping this summer, prices are firm in spite of the steel strike.

The trade now mentions the strong possibility that prices for low-sulfur "C" fuel could rise by 10¢ a bbl., or even 15¢ a bbl., even though a price hike would run into "heavy flack" from customers.

All That Glitters...

Shakiness in the propane market that followed a rather early 1¢-a-gal. advance gave way to price reductions of 0.5¢ a gal. last week. The producer who initiated the cut said it was made to reflect market conditions better. Propane stocks have been top-heavy this year, and early-September increases were considered premature by some in the trade.

Panic Button Pushed:

Detroit dealers were in a panic last week when Texaco cut its prices on gasoline to its dealers 0.8¢ a gal. on the eve of the 1¢ increase in the federal tax. Texaco said it had lowered its prices so that its dealers could be competitive. But blame was heaped on the action by those in the industry who saw it as a tax-absorption move and a threat to dealer profits. Detroit motorists, who bemoaned the 1¢ tax bite, were happy with the results.

The Market Place AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All prices as of October 5

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U. S. Gulf Coast, cargoes
- Gasoline, 98 oct prem 12.25-13
- Gasoline, 92 oct reg 11-11.5
- Kerosine 8.625-10.375
- Heating oil, No. 2 ..... 8.125-9.875
- Gas oil, 48-52 d.i. 8.375-10.125
- Fuel oil, bunker "C" $2.00-2.10

Caribbean, cargoes
- Avgas, Grade 100/130 ..... 15.25
- Gasoline, 93 oct research prem 11.25
- Gasoline, 87 oct research reg 10.375
- Gasoline, 79 oct research 9.625
- Gasoline, 70-72 oct motor method 9.5
- Kerosine 8.625-8.875
- Heating oil, No. 2 ..... 8.125
- Gas oil, 48-52, d.i. 8.375
- Fuel oil, bunker "C" $2.00

New York Harbor, barges
- Kerosine 9.35-9.6
- Heating oil, No. 2 ..... 8.85-9.1
- Fuel oil, No. 6 ..... $2.37-2.47

Okla-Group 3, northern shpt., bulk
- **Gasoline, 91 oct reg ..... 11↓-11.75↓**
- Kerosine 9.5-9.75
- Heating oil, No. 2 ..... 8-8.5
- Fuel oil, No. 6 ..... $1.40-1.80

Chicago, bulk
- Gasoline, 91 oct reg 11.75-12
- Heating oil, No. 2 ..... 9.125-10.85
- Fuel oil, No. 6 high sulfur 7.4-7.5

Los Angeles, rack
- Gasoline, 88 oct reg 11.65-12.65
- Diesel fuel, PS 200 ..... 8.5-11.25
- Light fuel, PS 300 ..... $2.80
- Heavy fuel, PS 400 ..... $2.15-2.35

Natural Gasoline, Grade 26-70
- FOB Group 3 ..... 4.5
- FOB Breckenridge, Tex. 4

LP-Gas
- **Propane, Oklahoma (Group 3) ..... 4.5↓-5***
- **Propane, Baton Rouge ..... 5.125↓-5.875***

Pennsylvania Lubes
- Bright stock, 25 p.t. 23
- 200 vis. neutral 25 p.t. 25

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i. 24-25
- Neutral, solvent 200-210 vis. 20.5-21.5

Gulf Coast Lubes
- Bright stock, solvent 95 v.i. 24
- Neutral, solvent, 200 vis. 20.5

**Effective Oct. 1.*

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130 ..... 16.5
- Gasoline, 79 oct research 10
- Kerosine 10.125
- Gas oil, 48 d.i. minimum 9.625

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, 36.0-36.9 ..... $2.62-2.97
- North Dakota, 36.0-36.9 ..... 2.62-2.87
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9 ..... 3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9 ..... 2.92-3.22
  - West Texas, sweet, 36.0-36.9 ..... 3.00
  - West Texas, N. M., inter., 36.0-36.9 ..... 2.93
  - West Texas, N. M., sour, 32.0-32.9 ..... 2.71
  - East Texas, flat 3.05-3.25
  - Mirando, 28.0-28.9 ..... 3.31
- Illinois Basin, flat 3.00
- Pennsylvania Grade, Bradford dist., flat 4.40
- California, Signal Hill, 21.0-21.9 ..... 2.22-2.32†
- North Louisiana-Arkansas, 36.0-36.9 ..... 2.77-3.02
- Wyoming, sweet, 36.0-36.9 ..... 2.85-2.90
- Wyoming, sour, 32.0-32.9 ..... 2.63-2.71

Canada (flat prices, at the well)
- Pembina (Alta.) 2.38
- Leduc-Woodbend (Alta.) 2.53
- Redwater (Alta.) 2.42
- Steelman A (Sask.) 2.435
- Virden (Man.) 2.31

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 47.0-47.9, Tucupido $3.34
- San Joaquin, 41.0-41.9, Puerto la Cruz 3.10
- Oficina, 35.0-35.9, Puerto la Cruz 2.78-2.80
- Tia Juana, Medium, 26.0-26.9, Amuay 2.30
- Bachaquero, flat, Las Piedras 1.73-1.88
- Tarra, 38.0-38.9, San Lorenzo 2.83
- Lagunillas Heavy, flat, Cardon 2.10

†Differential per deg. of grav. varies.

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura $1.90
- Safaniya, 27.0-27.9, Ras Tanura 1.50
- Iran, 34.0-34.9, Bandar Mashur 1.86
- Iran, 34.0-34.9, Abadan 1.81
- Iraq, 35.0-35.9, Fao 1.80
- Kuwait, 31.0-31.9, Mina-al-Ahmadi 1.67
- Qatar, 41.0-41.9, Umm Said 2.05
- Neutral Zone, Burgham, 23.5-24.4, Mina Saud 1.51
- N. Zone, Eocene-Ratawi, 20.5-21.4, Mina Saud 1.38

Middle East, Eastern Mediterranean
- Arabian, 34.0-34.9, Sidon $2.27
- Iraqi, 36.0-36.9, Tripoli, Banias 2.31

Far East, Cargoes FOB Lutong, Sarawak
- Seria Light, flat $2.57

KEY TANKER RATES

(Last paid, per long ton, single voyage)

U.S. Gulf-New York, clean (USMC—35%) $1.85↓
U.S. Gulf-New York, dirty ..... (USMC—32½%) $1.92
NWI-USNH, dirty ..... (USMC—55%) $1.24
NWI-UK/Cont., dirty ..... (Scale—30%) 22/9*
Persian Gulf-UK/Cont., dirty ..... (Scale—65%) 23/3*
Persian Gulf-USNH, dirty (USMC—72½%) $3.49↑

**Sterling.*

DEPT/Marketing

How Sun Oil Cuts Dealer Turnover

Over the first 18 months of Sun's new training program, the turnover of new dealers was cut to 5.3%—compared to 26.1% per year for the industry.

Sun Oil Co. may have found a solution to one of marketing's biggest problems—dealer turnover.

With a new program—which got under way in January, 1958—Sun reduced its turnover of trained dealers to 5.3% over an 18 month period, ending in June 1959.

Out of the 886 new dealers that completed Sun's new training program, only 46 have left. Although these 886 dealers do not represent all of Sun's approximately 4,000 lessee dealers, the training program represents a significant step in reducing total dealer turnover, the company feels.

Willard W. Wright, vice-president, marketing, is taking steps to have all of Sun's new dealers go through the program. At present 85% of Sun's new dealers receive the training.

When Sun assigns new dealers without training, turnover is about 35%, the company says.

The crux of Sun's significant attack on dealer turnover is an intensive, six-week training course for new dealers.

The course covers the gamut of service station operation—from driveway service, during the first week of the course, to neighborhood, solicitation, in the sixth week. Sun feels the course is a thorough preparation in dealer training.

The course is given at each of Sun's 13 widely scattered training stations. Generally, these stations are company-owned outlets. But in states where Sun fair-trades—such as in New Jersey and Pennsylvania—Sun uses lessee stations.

Each of the stations is equipped with a classroom, either actually attached to the station or located nearby.

Applicants for Sun dealerships are first screened by district committees, one member of which may even visit the home of the future dealer to meet his wife. If he is accepted, the trainee is assigned to a training station for six weeks.

Upon completing the course, the trainee returns to the district and takes over as dealer at a Sun station. Twice—three months and six months after he begins his dealership—the performance of the new dealer is reviewed.

The training course puts a special emphasis on managerial ability.

"It's the lack of managerial training that is the cause of most of the dealer turnover today," says Ralph R. Ross, manager of dealer development at Sun.

Under the guidance of seasoned marketing men—one of the instructors has had 28 years of experience—Sun's new dealers get a grounding in such management problems as "getting the most out of manpower," "financial statements," "merchandising and credit policies," and "collection, handling, and payment of taxes."

The instructors for Sun's training program are themselves carefully trained for their jobs.

The curriculum and the instructors for the 13 training stations are selected by various regional managers. At a station in Philadelphia, Sun orients all of its instructors and experiments with new teaching techniques.

Right now, Sun is studying a program for the training on more complicated repair jobs at its service stations.

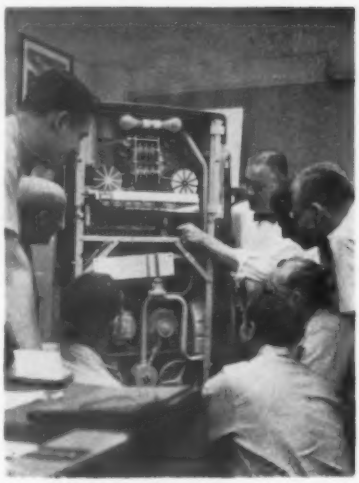
"We feel that we have the obligation to explain to our dealers the problems they face in going into tune-up and brake servicing," says Ross. These problems are first analyzed at the company's Broad Street station in Philadelphia.

Sun's instructors carry full responsibility for accepting or rejecting a trainee.

Prior to the present program, Sun delegated the responsibility for training to local station managers. The actual training was sometimes performed by college graduates who may have had no actual managerial experience at service stations.

This has been changed. As Ross says, "The instructors we now have live with these new dealers. They get to know all their faults and abilities. It's up to them to make the final decision on accepting them or not."

Sun estimates the cost of training each new dealer at $728 per trainee.



ONE OF THE FIRST lessons Sun's new trainees receive is an introduction to the mechanics of Sun's custom-blending pump.

Each trainee is paid $1.50 an hour for a 40-hour week during the six-week training period. In addition, all trainees who commute more than 100 mi. to the training station nearest them are given a per diem allowance of $8.50.

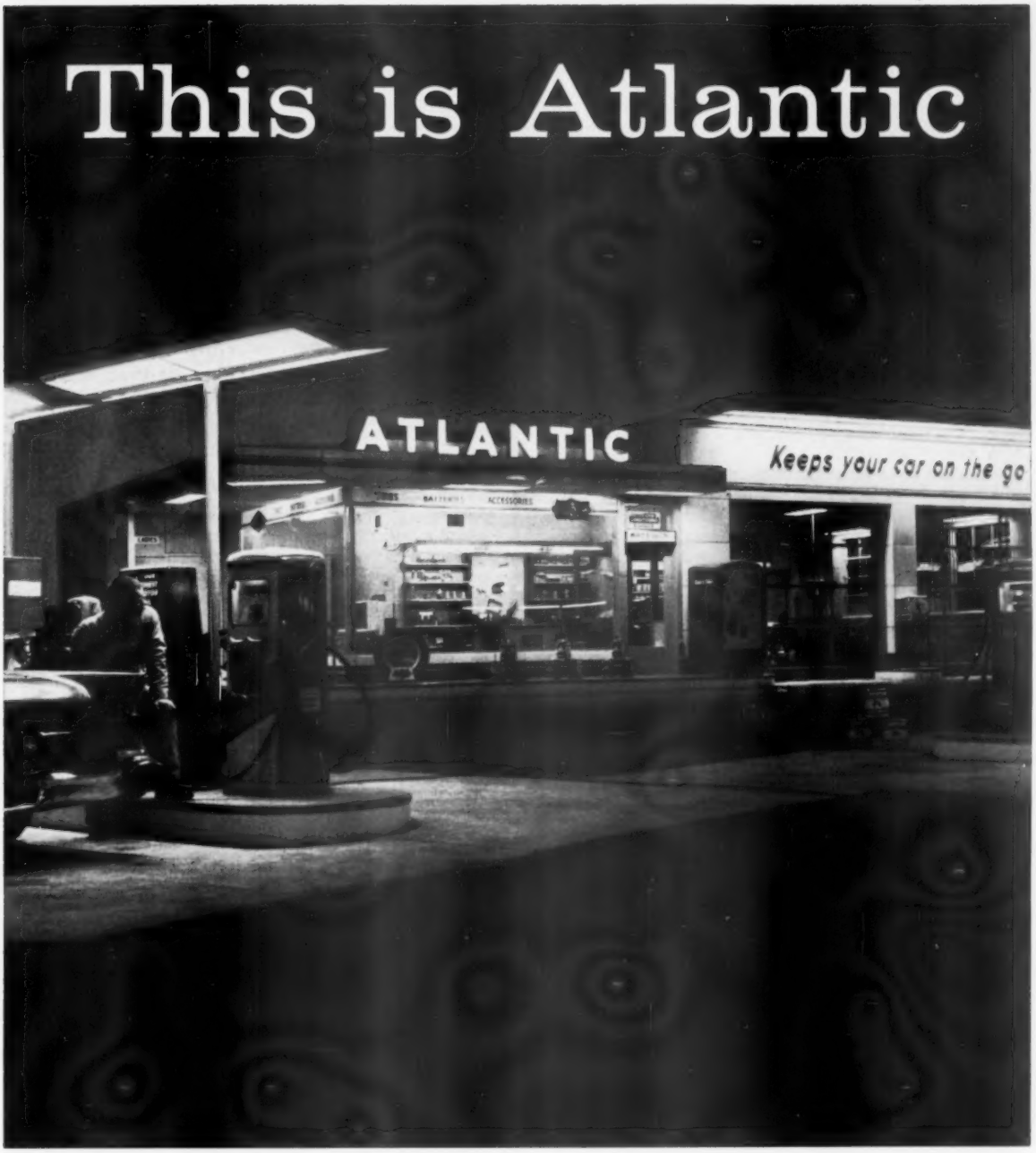
Ross told PETROLEUM WEEK that he had anticipated some difficulty in getting trainees to travel to the 13 training stations. But, surprisingly, this has not become a problem.

Why so much emphasis on training? Sun Oil believes that service station operation is becoming more and more complicated and more and more competitive each year.

"You can't put a man at a station that costs anywhere from $15,000 and $75,000 and expect him to make a profit unless he's been fully trained to run an efficient station," says Ross. "You'd be amazed at the lack of awareness of some dealers of the simplest management techniques."

Ross adds that most of Sun's turnover is caused by a lack of understanding of bookkeeping, profits, and salesmanship.

With competitive pressures growing and service station operation becoming more complicated (Sun sells six grades of gasoline and four grades of motor oil), the cost of putting an untrained dealer in charge of a service station is making training more and more necessary every year, Ross believes.



MARKETING: Available to the man at this pump is Atlantic's 88 years of marketing experience, and solidly behind him are factors that help produce retail success—quality products, thorough dealer training, sound financial counseling, modern service station facilities.

ATLANTIC

THE ATLANTIC REFINING COMPANY

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Fair Trade: A Threat to Major Brands?

James G. Jordan

Last month before the Ohio Petroleum Marketers Assn., James G. (Doc.) Jordan, Marketing Vice-President of Shell Oil Co., stressed the dangers inherent in fair trading gasoline. To present for its readers a contrasting view of fair trade, Petroleum Week last week asked Dwight T. Colley, Vice-President and General Manager of Marketing, Atlantic Refining Co., to comment on Jordan's talk. Here's what they said:

Dwight T. Colley

"Expanded and continued use of fair trade may well injure the status of branded products—even mean their liquidation."

• A widespread application of fair trade for an extended period of time could conceivably create a situation under which private or local brands would expand so far that in many major markets their volume would far exceed that of the so-called major or fair trade brands. In other words, the brands might well become liquidated.

• Theoretically, a supplier who fair trades can move his fair trade price down to meet such shading and cutting as may take place. In actual practice, we must remember that the fair trade price must cover a large geographical area—possibly as large as a state. For this reason, the supplier has much less flexibility because he has to take millions of gallons into consideration.

• Any widespread extension of fair trade by the petroleum industry may well cause additional harassment and government investigations. One might wonder if any outstanding success of fair trading in creating price rigidity might lead some states into the next logical step: an attempt to insure price stability by means of a state price utility commission of some nature.

• Most authorities agree that you have to try to enforce fair trade if it is to have any chance of working at all. So what happens? A supplier has some indications that a dealer is violating. Number one, he has to make a decision as to whether to file suit; number two, he has to get evidence; and number three, he has to institute and follow through on the case in the courts. Each of these steps is exacting and difficult.

• It would seem probable . . . that any supplier observing the fair trade price and engaging in fair trade would be inviting all non-fair-traders to declare open season on his dealers and their volume.

• I am not suggesting that any set of changes could lead marketers into a situation that is all cakes and ale—but I do have the conviction that the right of individual businessmen to compete and to make their own individual decisions is the bedrock on which our American business system has been built. This free market system may not be perfect, but it has certainly provided more things for more people than any other system in history. Any attempts to tamper with the free market system by restricting freedom in pricing would violate the fundamental premises of our system—and, in my opinion, only serve to injure rather than improve it.

"Fair trade is the best choice of major marketers in preventing the deterioration of their brands."

• Fair trade insures the integrity of the major brands by assuring consumers that the major brand stands for a quality they can trust. By using fair trade to put a stop to disastrous price wars among dealers selling the same brand, which eventually leads to a deterioration of service station personnel, service, and even product quality, major suppliers are protecting their brands—not liquidating them.

• I agree that it is costly to lower your price throughout an entire state or region to meet the prices of local private-branders. But this forces major companies to keep working to reduce their over-all marketing costs—which in many cases are too high.

• I do not see why the principles of fair trade will lead to tightening legislation. Certainly most of us marketing in New Jersey believe that fair trading there saved us from definite government price regulation. I think Doc is contradicting himself here; if, as he says, fair trade helps the private brander, I don't think the government will step in to stop fair trade.

• Although we must rely on the courts to put teeth in fair trade legislation, I think we have depended too heavily on the courts to enforce fair trade. If a dealer of mine is unwilling to fair trade, I should have the courage to stop letting him sell Atlantic products rather than take him to court.

• The thing we have to worry about is not that private branders and non-fair-trading suppliers sell at a lower price than our own, but that our quality and service is worth the price we're asking for it.

• I yield to no one in appreciating the value of the free enterprise system. However, I think most of us realize that the great competitive battle that is being fought in the petroleum business is destroying unnecessarily the life savings and personal energy of thousands of individual dealers. The people of this country, led by most of our responsible political leaders, decided long ago that the necessary competition in big business did not need to be carried out at the expense of the "little guy." Does anyone really believe today that the free enterprise system means the repeal of the fair labor standards and minimum wage laws that have become a basic part of American business?

What's New / IN MARKETING

New Station May Offer Food, Rest, a Swim

Major Oil Co. is planning to add not only a supermarket to its proposed service station site in Willimantic, Conn., but a swimming pool as well.

Martin A. Koenigsberg, president, told PETROLEUM WEEK last week that the layout may also include a motel, a Howard Johnson restaurant, and a theatre.

Plans for this 10-acre conglomeration are still "only on paper." But Koenigsberg hopes to break ground early next year.

As Koenigsberg sees it, "There just aren't enough places to swim in Connecticut any more. We hope people will come to our station and either shop or go swimming while they're waiting for their cars to be greased." They may also have lunch and take in a movie—without straying too far from the service station.

Koenigsberg, who claims to have pioneered in multiple-pump outlets in Connecticut, now controls four stations in the state.

•

Washington State dealers appear to have abandoned their intention to strike.

The board of directors of the Washington Gasoline Dealers Assn. met recently without discussing the possibility of a shutdown.

Strongest action at the board meeting was the drafting of a letter to Gov. Albert Rosellini, asking for a special session of the legislature "to act on gasoline distribution problems in the Seattle area that threaten soon to become state-wide" (PW—Sep.11'59, p54).

•

September octane ratings for both regular and premium gasolines remained unchanged from August, and superpremium ratings were down.

Regular gasoline averaged 92.1-octane and premium averaged 99.1, according to Ethyl Corp.'s survey.

For companies marketing superpremium gasolines, the survey showed an octane range of 100.7 to 102.4. The upper limit was 0.6 octane numbers below the August level.

•

The National Fueloil Council has expanded its promotional campaign to 53 fuel oil markets—nearly twice as many as last year. Ten of the markets are in the Midwest, 35 in the East, and 8 in the South.

NFC's promotional budget has climbed to $1,971,267—more than double last year's expenditure.

•

Engineering

Gasoline pumps are shrinking in size. A new pump—just waist-high—is 4 in. lower than other "low" pumps and 8 to 14 in. lower than standard pumps.

Built by Gilbert & Barker Mfg. Co., this new 44-in.-high pump brings the computer face down to the driver's eye-level.

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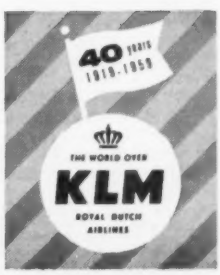

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DEPT/Service & Equipment Companies

W. R. CARNES is the new division manager of West Texas for Western Supply Co., and **W. A. Williams** is manager of the company's new store in Odessa. Carnes, with Western for the past seven years, has experience in store sales, store managing, and district sales. Williams was formerly district manager for Murray-Brooks, Inc., in the West Texas area.

T. M. Lamberth, Jr.

W. R. Carnes

TOM M. LAMBERTH, JR., becomes assistant to the Southwest district manager of Cooper-Bessemer Corp., with offices in Dallas. **Clifton W. Woltz** succeeds Lamberth as branch manager of the company's Shreveport office. Woltz has been a sales engineer in the Dallas office.

GEORGE E. HULSE has joined Chemetron Corp. as director of the newly formed research and development department in the Chemical Products Division, with headquarters at Newport, Tenn. Hulse has been director of plastics research for Spencer Chemical Co. for the past four years. In his new position, he will coordinate research and development activities for the division, which includes Holland Color & Chemical Co., Dunham Chemical Co., Girdler Catalysts, and Crestwood Chemicals.

REINHARD A. YOHPE has been appointed manager of research and development, and **Thomas E. Hall** manager of engineering (production), for Union Pump Co., Battle Creek, Mich. The new appointments are part of a reorganization in the company that created a new engineering research and development department and realigned production engineering. **J. Harold Wilde** was named to the newly created position of chief engineer—steam and power pumps, and **Daniel A. Jack** to the new position of assistant chief engineer—centrifugal pumps. **Donald R. Disbrow** retains his position as chief engineer—centrifugal pumps, a position he has held since 1942. Yohpe, with Union Pump for the past 30 years, was most recently chief engineer—power pumps and homogenizers. Hall was formerly administrative engineer for the Byron Jackson division of Borg-Warner Corp. Wilde was formerly chief engineer—steam pumps, and Jack was formerly a design engineer for the Byron Jackson division.

C. N. (Nick) VANCE joins Gustin-Bacon Mfg. Co. as sales representative for its line of couplings and fittings for plain and grooved-end pipe, in the West Texas, New Mexico, and Four Corners area. Vance was formerly vice-president and general manager for a Tulsa manufacturer of valves and other oil field equipment. He will have offices in Midland, Tex.

GEN. H. FRANKLIN GREGORY, (USAF, RET.), has been elected a director of Midwestern Instruments, Inc., Tulsa. After his retirement from the Air Force earlier this year, Gregory joined Midwestern Instruments as vice-president and assistant to the president.

G. Tucker

H. Wotkyns

HASKELL (Inky) WOTKYNS and **GUY TUCKER** are new division managers for American Iron & Machine Works Co. Wotkyns will be in charge of East Texas, the Texas Gulf Coast, Louisiana, California, and Mexico, with offices in Houston. Wotkyns was formerly special representative for American Iron in Tulsa. Tucker will be in charge of the Rocky Mountain and Canadian areas. He remains in Denver where he was formerly district manager.

E. C. BEVINS becomes location manager for Schlumberger Well Survey-

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ing Corp., at Fairmont, W. Va. **J. H. Gallois** is the new senior sales engineer for the company's Pacific Coast division, in Los Angeles, and **H. C. Wiese** is sales engineer there. **W. R. Lewis,** formerly field engineer at Midland, Tex., becomes sales engineer there.

U.S. INDUSTRIES, INC., has formed a new company in England, called U.S. Industries Inc., (Great Britain), Ltd. The new company was established to coordinate the European activities of two of USI's principal divisions, the Clearing division and the International division. Clearing manufactures metal forming presses and other machine tools in the United Kingdom, and International is a world-wide trading organization with offices in most principal countries. The board of the new USI British company consists of **John I. Snyder, Jr.,** chairman and president of USI, **Walter F. Wilmas,** executive vice-president; **I. John Billera,** senior vice-president, and two resident joint managing directors of the new company, **Donald Giles** and **Bernard C. Shrubsole.**

R. S. EDWARDS heads the new petroleum market section of Reynolds Metals Co.'s marketing organization, with offices in Richmond, Va. Before the recent expansion of the company's marketing organization, petroleum and chemical marketing were under one manager, **L. S. Beeler.** Beeler will now head the new chemical process industries market section. Edwards, with Reynolds since 1951, was most recently divisional industrial sales manager in Dallas. Beeler, with the company since 1952, became assistant manager of the chemical and petroleum market section in 1952, and manager in 1958.

R. S. Edwards

E. D. Verink, Jr.

ELLIS D. VERINK, JR., has been named manager of chemical and petroleum industry aluminum sales for Aluminum Co. of America. Verink, manager of the chemical section of Alcoa's sales division at New Kensington, Pa., since 1948, will move to the company's headquarters in Pittsburgh.

ROBERT L. CROWELL has been appointed to the field service staff of Oakite Products, Inc., manufacturer of industrial cleaning compounds. Crowell will be located in Oklahoma City.

B. H. MILNER has been appointed store manager for Jones & Laughlin Supply Division at Alice, Tex. He was formerly storeman at J&L's Luling (Tex.) store.

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was 45,781.

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By John J. Cooke, Secretary

Sworn to and subscribe before me this 10th day of September, 1959.
[SEAL] JANET A. HARTWICK.
(My Commission expires March 30, 1961)

ANOTHER LARGE AUCTION

Going Out of Business Sale

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Inspection Starting Oct. 19

Thornbrugh Well Servicing Co. is going out of business and has commissioned Wayne Cook Associates, Inc. to sell all of their servicing equipment and tools and all other items at public auction to the highest bidder. This equipment is good, has been working regularly, and is ready to go to work for you. Plan now to attend this sale.

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Wilson Model 38 Super Pulling Unit, single drum winch, air equipment, Wilson telescoping fabricated mast with outriggers and hyd. equipment and mtd. on 1956 Int. RF 192 Tandem truck, butane equipped.
Wilson Super Drawworks, skid-mounted, Int. U-450 eng.
Wilson Giant single engine drawworks, rotary dr., Waukesha GKU 145 eng., skid-mtd., on Nabors trailer, 8x10x87' double leg telescoping mast pole.
8x10x90' double leg telescoping mast pole, skid mtd. and 4x8x30' substructure.
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Where Do We Go From Here?

THE OIL INDUSTRY HAS POINTED with pardonable pride this oil centennial year to the vast improvements in tools and techniques that have been made since Col. Drake drilled his historic well in 1859.

But while progress admittedly has been made in all phases of the petroleum industry, there is no ignoring the nagging feeling that the tools and methods for drilling a hole for oil haven't really changed as much as they should have in 100 years.

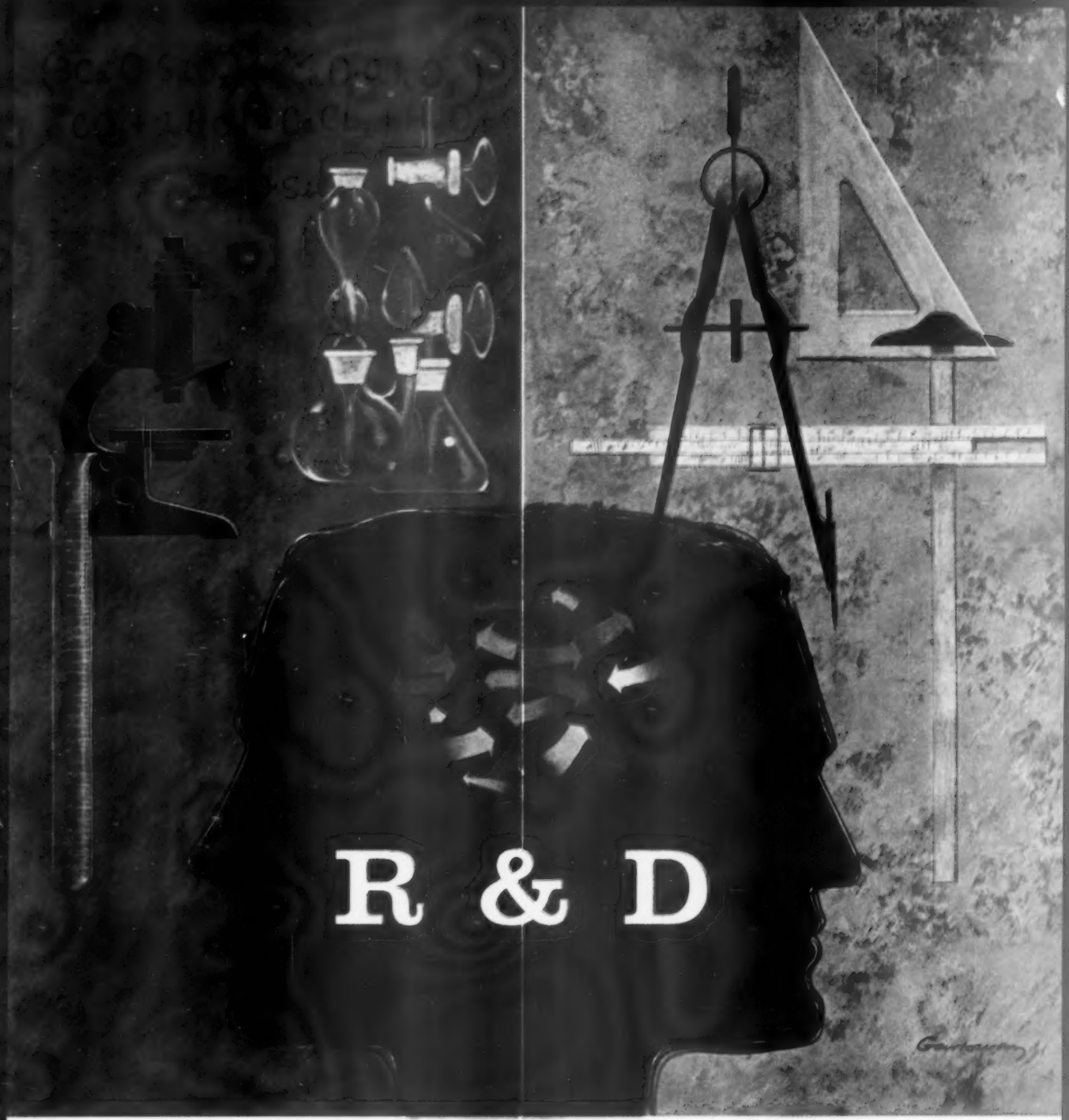
Drake's cable-tool method, for example, is still the preferred way to drill in many oil areas of the U.S. And while Drake's tools were, by our standards, crude and inefficient, they bore striking resemblance to tools still in use today. The changes that have evolved during the 100 years have, for the most part, been more of degree than of kind.

On the other hand, there is no denying the claim that real technological developments have been made in oil's first century. Where Drake drilled only 69½ ft., today's contractor can drill more than 25,000 ft. into the earth, and do it with tools that are the most efficient that science and technology can develop.

Related developments—such as improvements in drilling fluids and cements—have kept pace with changes in equipment. And laboratories are busier than ever as the search goes on for new and better materials, not only for today's wells but also for the 30,000-ft. holes that may be drilled within a few years and even the 50,000-ft. holes that could follow.

PRESENT TOOLS AND TECHNIQUES have been improved and refined so much, in fact, that there is little, if any, chance for a major technological breakthrough—without entirely new concepts. Such a major breakthrough, however, is needed to give the drilling contractors a new and potent weapon against the problem of the cost-price squeeze—one facet of drilling that has remained constant from 1859 to 1959, and will remain so to 2059 and beyond.

For these apparent reasons, and many others, it behooves the drilling industry to cast off the binds of traditional thinking and give full rein to the bold and imaginative. The new and unusual must be tried, and if they fail the failures should serve only as a spur to greater effort. Drake did it in 1859; it must be done now.



PARTNERSHIP MAKES PROGRESS

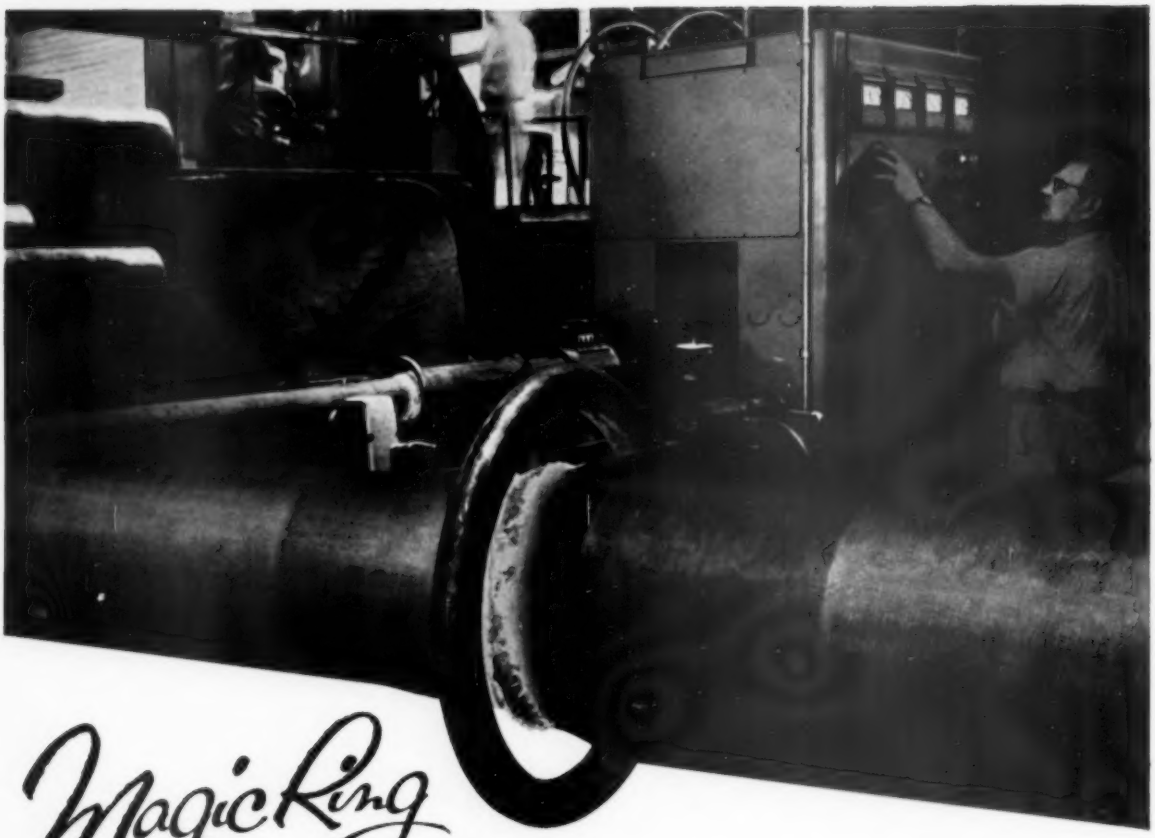
An industry can progress only from the basic elements that Research and Development make available to it...

From the idea stage, to the sample, test or prototype phase, and from there into finished product, Halliburton Research and Development are an integrated partnership. They make possible the results that are achieved in the field.

All these things happen because of the blending of many talents of the "men who are making tomorrow."

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA



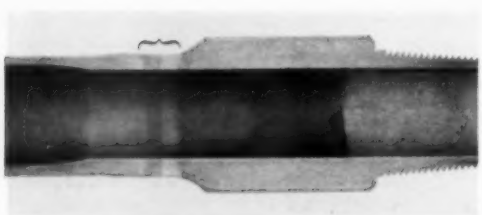
Magic Ring

makes Hughes Flash-Weld twice as strong!

A new process, developed by Hughes for heat treating "Flash-Weld" tool joint-to-pipe connections, has resulted in a major advance in drillstem construction. In this process an induction coil is used to normalize and stress-relieve the weld area—more than doubling the tension-impact strength of the connection.

Special electrical equipment, built to Hughes' own exacting specifications, performs this operation. After each joint is flash-welded to the pipe, the weld is automatically positioned inside the "magic ring." Induction heating to closely controlled temperature converts the metallographic structure within the weld affected area — ⅜" to ¾" on each side of weld—to a fine-grained, ductile, strong condition. After cooling, the weld is positioned in a second coil and heated to correct temperature for stress-relieving.

The result — proved in over 200 full scale tension impact tests — is a tool joint-to-pipe connection with metallographic uniformity across the weld that had not heretofore been available to the industry.



This cross-section of a finished "Flash-Weld" tool joint shows the very small area—only about ¾" on either side of the weld — that is affected by the new Hughes induction heat treating process. No other part of the pipe or joint reaches a temperature high enough to alter its metallurgical properties.

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS

50TH ANNIVERSARY YEAR
1909 – 1959